

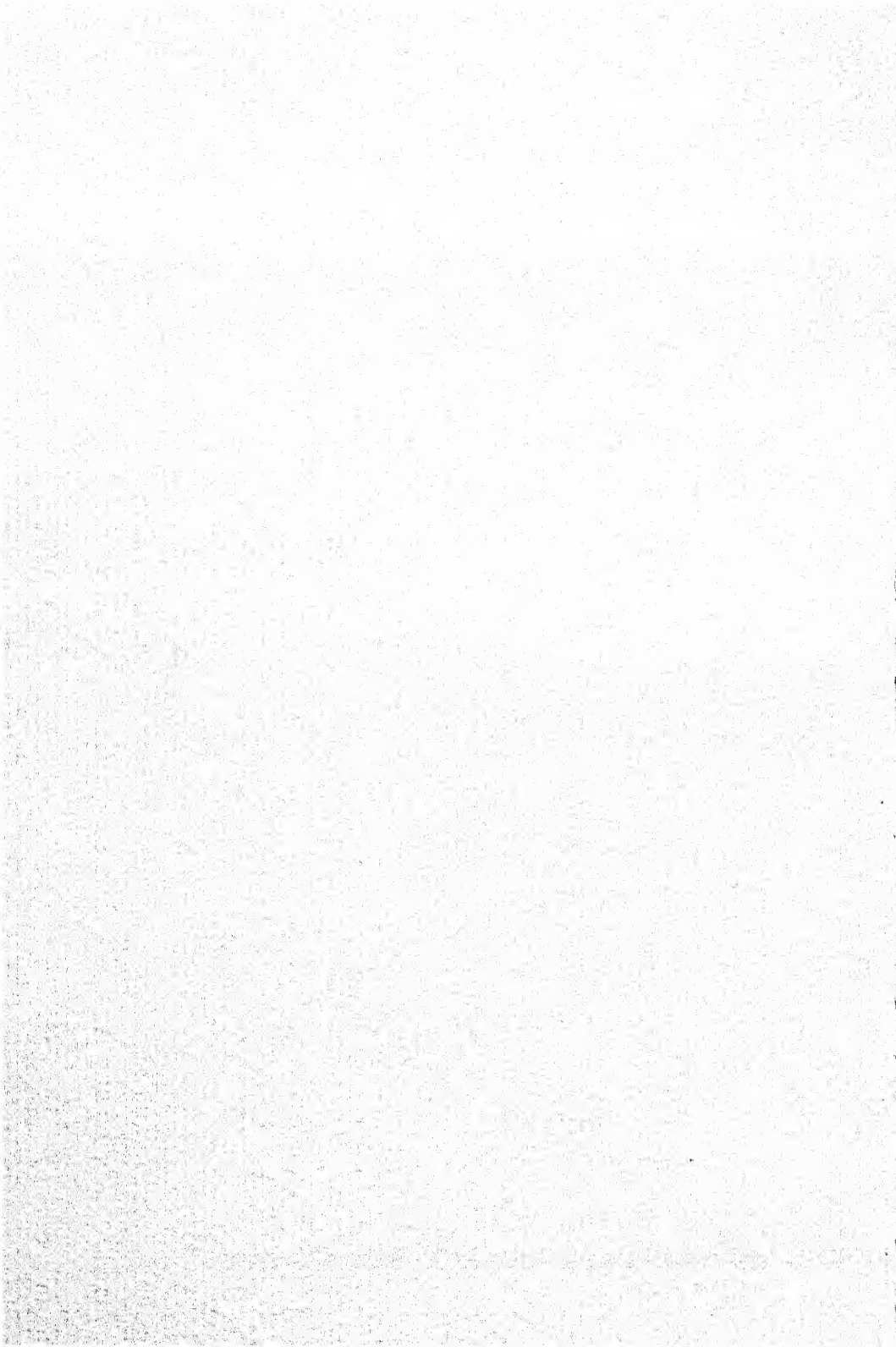
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**TABULAR KEYS**

FOR THE

**IDENTIFICATION**

**OF THE**

**WOODY PLANTS**





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TABULAR KEYS  
FOR THE  
IDENTIFICATION OF THE  
WOODY PLANTS

Compiled and arranged by

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## P R E F A C E

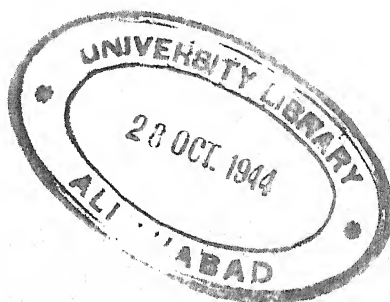
This set of TABULAR KEYS has been evolved for the use of students and others interested in the more used woody plants of the Northern States and Canada—for study and for identification in the field.

It cannot take the place of those more detailed and complete references already available nor is it so intended. It is rather designed for quick reference and comparison and for use in the field. The attempt has been made to eliminate as far as possible the use of instruments such as scalpel and microscope and to lead the student to observe and to identify from external characters.

The Keys include the five hundred trees, shrubs, vines, conifers, and broad-leaved evergreens heretofore described in the card file entitled "USEFUL TREES AND SHRUBS." These Keys supplement and complete that work. But the two can be used separately if desired. Every attempt has been made to verify the characters used and to check them against the work of standard authors. With a few exceptions, the nomenclature follows that of the last edition of the Manual by Alfred Rehder. In the interest of simplicity we have retained one or two names which much usage has seemed to justify and we have preferred to follow recent precedent in discarding the capitalization of species names and the double i ending. Changes from the card file can be noted in the list of names preceding the text.

In offering this set we trust it will prove helpful to students and useful to others.

FLORENCE BELL ROBINSON



## How To Use the Keys

Keys to the *genera* are similar in type to the keys found in all standard works on Botany, but differ from the other keys in the attempt to eliminate the use of scalpel and microscope, also in the addition of a key based on winter buds and twigs. These genera keys are adapted from those arranged by Dr. Trelease and published in "The Native and Naturalized Trees of Illinois." We are indebted to Dr. Trelease and Dr. Telson for their permission to do this. Data incorporated in the keys has been checked against the works of the following authorities—Gray, Rehder, Bailey, Trelease, as well as in the field. In only a very few instances have we taken the liberty to disagree with any of these authorities.

In using the keys, read all statements labelled A, AA, AAA and decide which one best fits the tree or shrub you are considering. If it belongs under A, then you have eliminated all under AA and AAA and need consider those no further. Similarly for AA or for AAA.

Below A is b and the latter is used twice, i. e. b and bb. Again decide which of the two fits the tree or shrub and then proceed to the next pair of statements, labelled c and cc. Continue this until the last statement leads to the name of a genus. For every positive statement there is a negative—a tree *is* or *is not* of a certain type, it *has* or *has not* a certain character. With that fixed in mind the keys are simple to use and the results you obtain depend only upon the accuracy of your observation and judgment.

Having traced the plant to the name of a genus, turn to the page and genus indicated and check the twig or leaf against the identification characters there stated for winter and for summer. If it fails to check at this point you have made an error and will need to begin over. But if you have been accurate, it will check. It sometimes occurs that one is not certain of some character to be observed, in which case it is necessary to proceed by the process of elimination. Assume the first statement and carry through. If it does not check at the end, go back and try the opposed statement and proceed until you get a positive check.

Continue the identification by means of the *tabular keys to the species*. Begin at column one—again you find a positive and a negative statement, both in column one. If the first statement fits, do not go below the line of the second. If the second statement fits better than the first, then skip everything above that statement. The full identification depends upon a combination of characters, as is clearly shown in this tabular key, and not upon any one characteristic alone. Follow each column through in turn, and decide upon the character that fits in each case. Having decided upon a character, you do not need to consider anything above that line in successive columns. When you have finished, the species of your leaf or twig will check horizontally across the page. The heavy dotted lines assist in tracing down the decisive differences between species. These are drawn solely for the purpose of clarity and have no other significance.

The heavy full lines and doubled lines assist in reading the keys rapidly. Heavy lines divide the species into smaller groups having similar characteristics, and the dotted lines call attention to certain important points of distinction between adjacent species.

Keys for trees, shrubs, vines, conifers, and broad-leaved evergreens are separated. Since each type of plant is thus considered separately it is necessary to decide first of all to which type the plant belongs. If not sure of this, the process of elimination can be used, trying each type in turn until you get a positive check on characteristics.

## KEY TO THE TREES WHEN IN LEAF

- A. Leaves persistent, simple, entire, resinous-dotted . . . . . Myrica
- A. Leaves deciduous in autumn; with a broad blade, not needle-like
  - a. alternate (one leaf at a node)
    - fruit a cone; buds solitary, stalked, with 3 scales which meet at the edges . . . . . Alnus
    - fruit not a cone; buds not as above
      - b. leaves simple
        - leaves parallel-veined, appearing fan-like . . . . . Ginkgo
        - leaves with a midrib, net-veined
          - leaves clothed with silvery or brownish scales . . . . . Elaeagnus
          - leaves without scales
            - c. margin entire, neither toothed nor lobed
              - sap milky, twigs spiny . . . . . Maclura
              - sap not milky, twigs not spiny
                - leaf broad as long, heart-shaped . . . . . Cercis
                - leaf longer than broad
                  - with a narrow scar completely encircling the twig at nodes . . . . . Magnolia
                  - without such scar
                    - leaf widest above middle and with veins anastomosing . . . . . Asimina
                    - leaf widest at or below middle or occasionally above middle but with veins not anastomosing, scarcely visible; leaf leathery.
                      - Underside finely hairy . . . . . Quercus
                      - Not hairy below
                        - twigs very slender . . . . . Celtis
                        - twigs moderately stout
                          - pith with diaphragms; leaf obovate, leathery, veins scarcely visible . . . . . Nyssa
                          - pith without diaphragms; leaf oblong . . . . . Diospyros
      - cc. leaf margin toothed
        - d. with several strong veins from the base.
          - e. about as broad as long
            - lobed . . . . . Kalopanax
            - not lobed . . . . . Tilia
          - ee. longer than broad . . . . . Celtis
        - dd. with only one strong vein from the base
          - twigs rather spiny
            - leaves folded in the bud; fruit apple-like . . . . . Malus
            - leaves rolled in bud; fruit pearlike; with many short spurlike branches
              - armed with long, sharp thorns; buds stout, red, with fleshy scales . . . . . Crataegus
          - not spiny nor armed with thorns
            - e. margin singly toothed
              - f. teeth coarse, or if small then widely spaced.
                - leaf base oblique . . . . . Ulmus
                - leaf base not oblique
                  - leaf about broad as long . . . . . Populus
                  - longer than broad
                    - teeth few or margin entire . . . . . Nyssa
                    - teeth many
                      - buds long, cigar-shaped. . . . . Fagus
                      - buds short
                        - leaves obovate, veins curved, teeth longish . . . . . Quercus



- leaves widest at middle;
  - veins quite straight, side
  - veins parallel, teeth short,
  - one at end of each vein . . . Castanea
- ff. teeth fine
  - petiole with small glands . . . . . Prunus
  - petiole without glands
    - leaves linear or lanceolate . . . Salix
    - leaves broader, ovate-lanceolate to ovate,
    - bark not scaly, looks muscular. Carpinus
    - bark scaly, leaf-base symmetrical
    - g. with stipules
      - stipules persisting, petioles short. . . . Photinia
      - stipules deciduous, petioles longer, slender. Amelanchier
  - gg. without stipules, leaves thin, bark shredding . . . Halesia
- ee. margin doubly toothed
  - base oblique . . . . . Ulmus
  - base symmetrical
    - bark scaly, peeling in long strips . . Ostrya
    - bark not scaly.
    - bark in layers, often papery . . . Betula
    - bark not in layers, muscular . . . Carpinus
- ccc. leaf lobed
  - h. with several strong veins from the base
    - sap milky . . . . . Morus
    - sap not milky; leaves broad as long
    - leaves notched at tip . . . . . Liriodendron
    - leaves palmate, maple-like
      - with a narrow scar around each node; base of petiole enlarged over the bud. . Platanus
      - without such scar, buds unconcealed . . Liquidambar
  - hh. with only one strong vein from the base; variously lobed
    - mucilaginous and aromatic; margin entire. . Sassafras
    - not so; margin toothed
      - pith star-shaped in section; buds with thin overlapping scales . . . . . Quercus
      - pith round; twigs with long, sharp spines; buds very short, red, with hard, thick scales
      - Grataegus
- bb. leaves compound
  - i. singly odd-pinnate
    - j. with stipules
      - margin serrate
        - leaflets often lobed; hairy, velvety . . . . . Koelreuteria
        - not lobed, not hairy . . . . . Sorbus
      - margin entire
        - armed
          - with paired spines at base of leaves . . . . . Robinia
          - with large simple or branched spines on the stem. Gleditsia
        - unarmed
          - leaflets usually alternate, elliptic to ovate, short acuminate; petiole swelled to cover the bud; branchlets brown . . . . . Cladrastis
          - leaflets oblong-elliptic, smaller, opposite, acute; branchlets green; buds not concealed . . . Sophora
    - jj. without stipules, unarmed
      - j'. margin serrate
        - with glands at base of leaflets; twigs yellowish, velvety . . . . . Ailanthus
        - without glands, pith star-shaped in section
        - pith solid; leaves hard, lustrous, or nearly tomentose, and glandular when young . . . Hicoria

- pith chambered, i.e. with cavities; leaves soft, dull . . . . . Juglans
    - jj' margin almost entire; without glands; bark shredding; fruit a capsule . . . . . Cedrela
  - ii. leaves doubly pinnately compound
    - armed with large, simple or branched spines on the stem; leaflets small, oval or elliptic . . . . . Gleditsia
    - unarmed
      - margin entire; leaflets larger, ovate . . . . . Gymnocladus
      - margin toothed or lobed; leaves hairy . . . . . Koelreuteria
  - iii. leaves palmately 3-parted . . . . . Laburnum
- aa. leaves opposite
  - j. simple
    - lobed . . . . . Acer
    - not lobed
      - k. margin entire
        - leaves broad, net-veined; bark cherry-like . . . . . Syringa (see shrubs)
        - longer, suborbicular or elliptic to oblong; veins anastomosing; bark not cherry-like . . . . . Cornus
      - kk. margin crenate-serrate or serrate
        - twigs swollen at the nodes; leaves not lobed . . . . . Cercidiphyllum
        - twigs not swollen at nodes; leaves occasionally lobed . . . . . Acer
    - jj. compound
      - leaflets pinnate
        - leaves punctate with pellucid dots; twigs glossy . . . . . Phellodendron
        - leaves not as above
          - leaflets lobed or at least the lower ones; twigs bloomy . . . . . Acer
          - leaflets not lobed; twigs not bloomy . . . . . Fraxinus
      - leaves palmate
        - twigs stout, buds large . . . . . Aesculus
        - twigs slender, buds small . . . . . Acer
- aaa. leaves whorled, i.e. more than two at a node.
  - leaves 3-5 veined at the base; petioles and twigs glabrous . . . . . Catalpa
  - with one main vein; petioles and twigs rusty pubescent or tomentose . . . . . Paulownia

# KEY TO THE TREES IN WINTER

- a. leaf scars whorled or opposite
  - scars notched at the top; buds superposed; fruit an ovoid capsule . . . . . Paulownia
  - scars not notched; buds not superposed; fruit a very long, terete pod . . . . . Catalpa
- aa. leaf scars opposite
  - b. twigs swollen at nodes; buds often developing short spurs. . . . . Cercidiphyllum
  - bb. twigs not swollen at nodes
    - twigs covered with silvery or brown scales (appearing in very young growth like the fuzz of a peach); bark fibrous, interwoven . . . . . Elaeagnus
    - twigs not covered with scales
      - end-bud lacking, twigs forking, bark cherry-like . . . . . Syringa (see shrubs)
      - end-bud or its scar present
        - end-bud very large ( $\frac{1}{2}$ " or more); twigs thick. . . . . Aesculus
        - end-bud moderate or small ( $\frac{1}{4}$ " or less)
          - c. leaf-scars meeting around the twig
            - scars small, often on raised bases, crescent-shaped; joined by a concave line; bud-scales nearly or quite valvate . . . . . Cornus

- scars V-shaped, meeting in a convex line, an inverted V or ragged line; bud scales imbricate . . . . . Acer
- cc. leaf scars not meeting around the twigs; buds sessile leaf scars shield-shaped; buds with 2-4 scales; bundle traces numerous in an ellipse. Fraxinus
- leaf scars horseshoe shaped, almost meeting around the bud; buds compressed from the sides and silky-brown hairy . . . . . Phellodendron
- aaa. leaf scars alternate (only one at a node)
  - d. fruit a cone; ordinary leaf scars present; buds moderately large, solitary, stalked, with 3 scales which meet at the edges . . . . . Alnus
  - dd. fruit not a cone; buds not as above
    - e. buds hemispherical, with many scars clustered about them, developing into short spurs . . . . . Ginkgo
  - ee. not thus
    - f. leaf scars very large
      - g. twigs thick, end-bud lacking
        - twigs yellowish, velvety; buds solitary, smallish, hairy, located close to scar . . . . . Allanthus
        - twigs glabrous, glossy, whitened as though with paint; buds minute, superposed, in tiny silky craters removed from the scar . . . . . Gymnocladus
      - gg. twigs moderately thick, end-bud present
        - buds superposed, hairy, fairly large; pith with cavities; fruit a nut; twigs more or less fluted; bundle traces in 3 groups . . . . . Juglans
        - buds solitary; twigs terete; bundle-traces 5; fruit a capsule . . . . . Cedrela
    - ff. leaf scars moderate or small
      - h. twigs green
        - mucilaginous and aromatic; buds small, glabrescent, subglobose with fleshy scales . . . . . Sassafras
        - not mucilaginous nor aromatic nor with fleshy scales.
          - i. buds silvery, silky-hairy
            - stipules persistent; twigs slender . . . . . Laburnum
            - stipules not persistent, their scars left; twigs moderate, encircled by a line at the nodes . . . . . Magnolia
          - ii. buds not silvery, silky-hairy, but woolly, superposed, at first covered by the leaf scar; sometimes thorny . . . . . Sophora
        - hh. twigs not green
          - j. with a narrow scar encircling the twig at the nodes
            - buds long, slender, pointed (cigar-shaped) . . . . . Fagus
            - buds not long and pointed
              - terminal buds flattened like a thumbless mitten over the twig-tip, with two valvate scales . . . . . Liriodendron
              - terminal buds not flattened, with 1 scale only
                - buds hairy; leaf scar U-shaped . . . . . Magnolia
                - buds not hairy, leaf scar scalloped, encircling the bud . . . . . Platanus
          - jj. scars not or rarely meeting around the twig.
            - k. with spines or thorns
              - twigs with silvery or brown scales . . . . . Elaeagnus
              - twigs not scaly
                - l. with thorns or prickles between the nodes
                  - prickles short, numerous . . . . . Kalopanax
                  - thorns long, large, often branched; nodes swollen, reddish, looking like an angry sore . . . . . Gleditsia
                - ll. thorns or prickles at the nodes only
                  - thorns stipular, paired . . . . . Robinia
                  - thorns not stipular
                    - thorns small, slender, beside the

- bud (lateral); buds with thin scales; sap milky . . . Maclura
  - spines long, stiff, sharp, axillary, becoming twigs; buds with firm, hard, fleshy scales, usually red; sap not milky . . . Crataegus
- kk. without spines or thorns
  - twigs resinous-dotted . . . Myrica
  - twigs not resinous-dotted
    - end-bud naked; buds silky-brown hairy . . . Asimina
    - end-bud with scales, or lacking
      - m. lowest bud scale centered over the leaf scar
        - bud with only 1 scale . . . Salix
        - bud with several scales . . . Populus
      - mm. lowest scales at side of bud
        - bark silvery; twigs with corky ridges; pith star-shaped . . . Liquidambar
- not thus
  - n. buds superposed
    - pith solid, crossed by diaphragms . . . Nyssa
    - pith not solid or not crossed by diaphragms
      - leaf scar C-shaped, almost encircling the buds; buds brown-silky in aggregates resembling single buds . . . Cladrastis
      - leaf scar more narrow; bark of twigs scurfy, rubbing off in fine, hairlike threads; buds with 4 fleshy red scales . . . Halesia
    - bark not scurfy
      - buds rather large; scars with numerous bundle traces in 3-4 groups; pith solid . . . Hickoria
      - buds smaller; bundle traces 3
        - twigs almost black or with a reddish cast; scars fringed at the top; flower-buds between the nodes . . . Cercis
      - twigs lighter; pith solid and crossed by diaphragms . . . Nyssa
  - nn. buds solitary
    - buds  $\frac{1}{2}$ -ellipsoid, directed almost at right angles to the twig and with 2 exposed scales . . . Koelreuteria
    - buds not as above, spreading
      - o. buds red, or green tinged red.
        - buds long, slender, with twisted scales . . . Amelanchier
        - buds short, stout, with

fleshy scales . . . . . Tilia  
 oo. buds not or very slightly red  
   p. bud scales keeled  
     scales mucronate; twigs slender,  
       not spinescent . . . Photinia  
     scales not mucronate; twigs moderate,  
       spinescent . . .  
     scales pubescent and margined . . Malus  
     scales glabrous, not margined . . . Pyrus  
 pp. bud scales not keeled nor mucronate  
   q. buds in two rows (2-ranked)  
     without stipule scars; buds a  
     little flattened . . . . . Diospyros  
     with stipule scars  
       with 2 or 3 scales; bud not  
       flattened; pith 3-sided,  
       continuous, green . . . . Betula  
   with more than 3 scales  
     r. bud scales in 2 rows,  
       bark scaly  
       scales not striate . . . Ulmus  
       scales striate . . . . . Ostrya  
   rr. bud scales in 4 rows; bark  
     muscular . . . . . Carpinus  
 qq. buds not in 2 rows  
   s. twigs more or less fluted,  
     moderate  
     end-bud solitary or lacking;  
       bundle traces 3 . . . Castanea  
     end-bud multiple; bundle  
       traces numerous, more  
       than 3 . . . . . Quercus  
 ss. twigs rounded  
   buds elongated, end-bud  
     rather large and covered  
     with long, white hairs  
     emerging from inner  
     scales . . . . . Sorbus  
   buds all smaller; often  
     collaterally multiple  
   buds fat, sap milky . . . Morus  
   buds slender, sap not milky  
     twigs with a bitter  
       almond flavor . . . Prunus  
   twigs not flavored  
     buds very small, closely  
     appressed; bark  
     with corky warts  
     or ridges . . . . . Celtis



The Genus ACER is distinguished in

SUMMER : by the opposite arrangement with the leaf scars meeting in a point; the leaves thin, generally lobed, palmately veined; the fruit a paired samara.

WINTER : by the opposite arrangement, with the leaf scars meeting in a point and ciliate at the top; twigs rather slender; buds sessile, of moderate size, with imbricate scales.

| Species        | leaves   | leaf form        | lobe tips                              | leaf edge                  | under side of leaves         | flowers                  | veination          | sap       | sinus       | leaf shape        |
|----------------|----------|------------------|--|----------------------------|------------------------------|--------------------------|--------------------|-----------|-------------|-------------------|
| negundo        | compound | lobed            |  | doubly serrate             |                              |                          |                    |           |             |                   |
| tataricum      | simple   | not lobed        |  | serrate                    | pubescent                    |                          |                    |           |             |                   |
| campestre      | "        | 3-lobed          | obtusely taper-pointed                 | entire doubly serrate      | light green white-downy      | corymbs erect panicles   |                    | milky     |             |                   |
| spicatum       | "        | "                | "                                      | "                          | glabrous                     | pendulous                |                    |           |             |                   |
| ginnala        | "        | "                | " central lobe long                    | "                          |                              |                          |                    |           |             |                   |
| pennsylvanicum | "        | "                | pointed                                | serrulate                  | brown-vil-lous first         | racemes pendulous        |                    |           |             |                   |
| pseudoplatanus | "        | 5-lobed          | acute                                  | fully serrate              | green                        | pendulous                | impressed          | not milky |             |                   |
| saccharinum*   | "        | "                | acuminate                              | deeply serrate             | white-glaucous               | panicles lateral corymbs | not impressed      | not milky | deep oval   |                   |
| rubrum         | "        | "                | acute or acuminate                     | crenate-serrate            | "                            |                          |                    |           | broad angle |                   |
| palmatum       | "        | deeply 5-7 lobed | acuminate                              | full doubly serrate        | glabrous, bright gr.         | few-fl'd corymbs         |                    |           |             |                   |
| platanoides    | "        | "                | finely pointed                         | coarsely dentate           | glabrous, lustrous           | corymbose leafy          | bearded in axils   | milky     |             | broader than long |
| saccharum      | "        | "                | 3-pointed                              | few coarse teeth           | glabrous pale soft-pubescent | pendulous corymbs        |                    | not milky |             | longer than broad |
| nigrum         | "        | "                | central pointed with blunted shoulders | teeth                      |                              |                          |                    |           |             |                   |
| circinatum     | "        | 7 or more lobes  | acute                                  | irregularly doubly serrate | becoming glabrous            | corymbs, petals white    | all parts glabrous | "         | shallow     |                   |
| palmatum       | "        | "                | acuminate                              | "                          | glabrous                     | purple corymbs           | "                  |           | deep-cut    |                   |
| japonicum      | "        | "                | "                                      | "                          | glabrous except on veins     | purple corymbs           | pubescent          |           | "           |                   |

The Genus ACER is distinguished in

WINTER : by the opposite arrangement with the leaf scars meeting in a point and ciliate at the top;  
twigs rather slender; buds sessile, of moderate size, with imbricate scales.

| species        | bud<br>scales | no. scales<br>exposed | buds                          | twig color                | texture    | leaf scars                 | twigs                 | bark                       |
|----------------|---------------|-----------------------|-------------------------------|---------------------------|------------|----------------------------|-----------------------|----------------------------|
| spicatum       | valvate       | one pair              | slender,<br>short             | gray                      | puberulent |                            |                       |                            |
| pennsylvanicum | "             | "                     | large, stout<br>blunt         | green                     | glabrous   |                            |                       |                            |
| palmatum       | "             | two                   | short, no<br>end-bud          | brown                     | glabrous   | low and<br>narrow          | never bloomy          | green striped<br>white     |
| Japonicum      | valvate       | more than<br>two      | "                             | green                     | "          | broad, top<br>winged       | glabrous,<br>slender  |                            |
| circinatum     | valvate       | one pair              | "                             | purplish                  | "          | broad, not<br>winged       | glabrous              |                            |
| negundo        | "             | two                   | end-bud;<br>short, fat        | glaucous,<br>green or red | hairy      | minute red<br>glands above | "                     |                            |
| rubrum         | imbricate     | four                  | multiple,<br>fascicled        | scarlet to<br>crimson     | glabrous   | meet in a<br>point         | glabrous,<br>bloomy   |                            |
| saccharinum*   | "             | 4-6                   | "                             | red-brown                 | "          | "                          | crimson<br>slender    | firm                       |
| platanoides    | "             | "                     | large,<br>flushed red         | tinged red                | "          | "                          | glabrous,<br>moderate | lenticellate<br>gray-brown |
| nigrum         | "             | more than<br>six      | acute                         | dull<br>straw-color       | pubescent  | "                          | slender,              | dark gray                  |
| saccharum      | "             | "                     | "                             | dark buff                 | glabrous   | "                          | dull<br>slender,      | medium<br>gray             |
| pseudoplatanus | "             | six                   | large, acute,<br>bright green | brown                     | "          | "                          | polished<br>moderate, |                            |
| campestre      | "             | 6-8                   | short, blunt,<br>ovoid        | gray                      | woolly     | "                          | glabrous<br>moderate, | slightly<br>corky          |
| ginnala        | "             | "                     | very small,<br>blunt, ovoid   | red-brown                 | glabrous   | "                          | pubescent<br>slender, |                            |
| tataricum      | "             | "                     | small, blunt,<br>ovoid        | blackish                  | "          | "                          | glabrous<br>slender,  |                            |
|                |               |                       |                               |                           |            |                            | glabrous, dark        |                            |

Winter Key -- ACER

The genus *AESCULUS* is distinguished in

**SUMMER** : by the opposite arrangement; large, palmately compound leaves without stipules; flowers long-clawed.

**WINTER** : by the stout twigs; opposite arrangement; very large buds; and large, low, triangular leaf-scars.

#### Summer Key

| Species              | fruit                         | bud             | leaflets                             | leaf edge               | flowers                             | habit      | petals  |
|----------------------|-------------------------------|-----------------|--------------------------------------|-------------------------|-------------------------------------|------------|---|
| <i>glabra</i>        | prickly                       | dry             | 5, obovate                           | serrate                 | yellowish with long stamens         |            | eglandular, margin villous; nearly equal; claws longer than calyx |
| <i>carnea</i>        | "                             | sticky          | 5-7, oblong, sessile                 | doubly serrate          | salmon pink to scarlet              |            | glandular, villous on margin                                      |
| <i>hippocastanum</i> | subglobose prickly subglobose | at first sticky | subsessile 7, obovate, sessile       | obtusely doubly serrate | white spotted red, stamens exserted | tree       | 5, claws not longer than calyx                                    |
| <i>octandra</i>      | smooth                        | dry             | petioled                             | finely serrate          | yellow, calyx glandular-villous     | large tree | petals unequal, calyx glandular-villous                           |
| <i>pavia</i>         | "                             | "               | petiolate, glabrous beneath          | serrate                 | reddish, calyx tubular              | small tree | glandular margined  |
| <i>parviflora</i>    | "                             | "               | 5-7, elliptic gray-pubescent beneath | crenate-serrulate       | white, small, stamens long          | shrub      | 4-5, $\frac{1}{2}$ length of the stamens or less                  |

#### Winter Key

| species              | buds                 | habit         | bark               | bud scales   |
|----------------------|----------------------|---------------|--------------------|--|
| <i>hippocastanum</i> | sticky               | tree          |                    |  |
| <i>carnea</i>        | sticky, becoming dry | "             |                    |  |
| <i>glabra</i>        | dry                  | "             | rough, soft, corky |  |
| <i>octandra</i>      | dry                  | "             | smooth, firm       |  |
| <i>pavia</i>         | dry                  | tree or shrub |                    | lowest less than $\frac{1}{2}$ the length of the bud |
| <i>parviflora</i>    | dry                  | shrub         |                    | lowest $\frac{1}{2}$ as long as the bud              |

**ATLANTHUS ALTISSIMA\*** is distinguished in

**SUMMER** : leaves alternate, pinnately compound, stipular, margin toothed and with glands at the base of the leaflets; branchlets and petioles glabrous or slightly puberulous; leaflets glabrous on the under side; odor unpleasant when bruised; fruit winged, in paniculate clusters.

**WINTER** : leaf scars alternate, large; end-bud lacking; twigs yellowish, velvety; lateral buds solitary, smallish, hairy, with 2-4 scales, located close to the leaf scar; odor rank when cut or bruised.

The Genus **ALNUS** is recognized in

**SUMMER** : by the thick leaves with impressed, reticulate veination; stalked, axillary buds; cone-like fruits; and triangular twigs with a three-sided or triangular pith.

**WINTER** : by the stalked brown-violet buds with three valvate scales, almost triangular in cross section; twigs and pith triangular; woody cones persistent. Later - in early spring, the flowers with four stamens.

| species   | pistillate catkins              | winter buds  | flowers           | twigs                                 | cones                                     | young growth                 | cone position | leaves   |
|-----------|---------------------------------|--|-------------------|---------------------------------------|---|------------------------------|---------------|--|
| viridis   | terminal, protected within buds | sessile, with 2 or more unequal scales             | with the leaves   | more or less pubescent                | having seeds with a broad membranous wing | glutinous                    |               | ovate, finely serrulate, broad cuneate, 5-10 pairs veins                           |
| glutinosa | axillary, exposed               | stalked, with 2-3 equal scales; leaves plicate     | before the leaves | glabrous, young growth very glutinous | all distinctly peduncled                  | very glutinous               |               | green beneath, obtuse, dentate, bearded  |
| rugosa    | "                               | "  | "                 | puberulent, rarely densely villous    | partly sessile                            | glutinous                    | upright       | green beneath, serrulate, bearded  |
| incana    | "                               | "  | "                 | pubescent                             | sessile or stalked                        | tomentose or nearly glabrous | nodding       | glaucous beneath or tomentose, not bearded   |
| japonica  | "                               | stalked, with 2-3 equal scales; leaves not plicate | "                 | glabrous or slightly pubescent        | peduncled                                 | glabrous                     |               | long-lanceolate, acuminate, cuneate, remotely serrate, veins curved, axils bearded |

Winter and Summer Keys combined

--- ALNUS

ATLANTHUS

--- ALNUS

The Genus **AMELANCHIER** is recognized in

**SUMMER** : by the alternate leaves which are thin, light in color tone, simple, oval or oblong, with a finely serrate edge; flowers white, in loose racemes, with 5 slender petals; fruits small berrylike pomes, red or purple, sweet and edible.

**WINTER** : twigs slender, zigzag, red-gray; buds red, long, slender, sessile, with about 6 twisted scales; leaf-scars two-ranked, slightly elevated, crescent-shaped, with three bundle traces and no stipule scars.

| species      | styles                       | summit of ovary | sepals                       | habit                     | buds                           | leaves   | bark  | leaf form                                |
|--------------|------------------------------|-----------------|------------------------------|---------------------------|--------------------------------|--|---|--|
| ovalis       | very short distinct          |                 |                              |                           |                                |  |   |  |
| florida      | prominent, joined at base, 5 | woolly          | short, recurved              | shrubby, branches upright | blackish, stout                | oval, glabrous, coarsely serrate above the middle  |   |  |
| laevis       | "                            | glabrous        | erect                        | tree to 50-70'            | more red than A. canadensis    | coarsely callus-serrate, glabrous from the first, often bristly-purple densely white-woolly when young | red-brown with dark lenticels; abruptly short twigs pointed, glabrous | elliptical, acute or abruptly short      |
| oblongifolia | "                            | "               | erect, lance-deltoid         | shrubby in dense clumps   |                                |  | red-gray  | oblong, apex rounded or acutish          |
| canadensis   | "                            | "               | ovate, reflexed almost erect | small tree 30-40'         | slender, green or tinged brown | densely white-woolly when young; finely serrate  | ash-gray with pale lenticels; acuminate young twigs hairy             | obovate, or oblong, lenticels; acuminate |

Summer and Winter Keys combined -- **AMELANCHIER**

The Genus **ASIMINA** is distinguished in

**SUMMER** : by the large, alternate leaves, obovate-oblong, simple, entire, pinnately veined, anastomosing, estipular, short acuminate, cuneate; petiole short; flowers appearing with the leaves, axillary, solitary, deep red-violet, with 3 sepals and 6 petals; fruit a rather large, edible, oval to oblong berry with flattened seeds in 1-2 ranks, greenish-yellow turning brown.

**WINTER** : shrub or small tree with an unpleasant odor when bruised; twigs moderate, red-pubescent when young, becoming glabrous and brownish; pith terete, white, continuous, with greenish diaphragms, becoming brownish and chambered; terminal bud naked, elongated, red-tomentose, lateral buds oblong or globose, subsessile, oblique; leaf scars alternate, 2-ranked,  $\frac{1}{2}$ -round becoming crescent shaped by rupture of membrane over buds, with 5-7 or more bundle traces and no stipule scars

*Asimina triloba*



The Genus BETULA is recognized in

**SUMMER** : leaves alternate, petioled, ovate, usually serrate; flowers monoecious, in catkins; fruit a minute nut with membranous wings, formed in cone-like clusters with deciduous, leafy bracts which shed from the tip of the cluster.

**WINTER** : Twigs slender, zigzag, terete, frequently with dwarf shoots which make the lateral buds appear stalked; pith minute, triangular, greenish; buds moderate, solitary, tapering at both ends, with 2-3 exposed scales, imbricate; leaf scars alternate, half-elliptical, small, with two bundle traces and narrow stipule scars.

| species            | habit                   | bark                                | bark structure  | branchlets                                    | leaf tip                      | leaves  | leaf edge                            | pubescence                             |
|--------------------|-------------------------|-------------------------------------|---|---|-------------------------------|---|--------------------------------------|--|
| <i>pumila</i>      | shrubby                 | dark                                |   | densely tomentose, with long hairs            | acute                         | obovate, 4-6 pairs veins,   |                                      | pubescent when young                   |
| <i>nana</i>        | shrubby, low, spreading | "                                   |   | glabrous, glandless                           | rounded                       | suborbicular, gland-dotted beneath, 4-6 pairs veins                   |                                      | glabrous                               |
| <i>nigra</i>       | tree                    | orange-brown                        | loose and shaggy  | no odor or flavor, pubescent                  |                               | rhombic-ovate, 7-9 pairs imbricated veins, often white                |                                      |  |
| <i>lutea</i>       | "                       | yellowish                           | splitting in filmy layers                                 | pubescent, slightly flavored, bitterish       | oblong-ovate, lighter beneath | tomentose under oblong-ovate, finely serrate beneath, 7-9 pairs veins |                                      | pale hairs on veins above and below    |
| <i>lenta</i>       | "                       | red-brown                           | firm, cherry-like; not in filmy layers                    | resinous-glandular, glabrous                  |                               |   | sharply doubly serrate               |  |
| <i>populifolia</i> | "                       | chalky-white rubs off slightly      | in layers   | resinous-glandular, glabrous                  | acuminate                     | deltoid, long acuminate, 3-7 pairs veins, glabrous, lustrous          |                                      |  |
| <i>papyrifera</i>  | "                       | white, rubs off freely, exfoliating | splits in thin layers; under ones cream to cinnamon color | pubescent or glabrous, not resinous-glandular | acute                         | ovate, base subcordate, veins hairy beneath                           | coarsely serrate, not deep where cut | hairy only where sheltered             |
| <i>pendula</i>     | eventually pendulous    | creamy-white rubs off; exfoliating  | fewer layers  | resinous-glandular, glabrous                  |                               | rhombic-ovate acuminate cuneate                                       | serrate deeply cut                   | persistent leaves glutinous when young |

Summer and Winter Keys combined -- BETULA

The Genus *CARYA* \* is distinguished in

**SUMMER** : trees with a hard, tough wood and scaly buds; leaves alternate, pinnately compound, the tip three leaflets larger than the lower ones, estipulate; flowers with the leaves, of two kinds on the same tree, in catkins, the staminate flowers in axillary, pendulous aments, the pistillate flowers sessile, in terminal spikes; fruit a nut in a 4-valved husk.

**WINTER** : twigs terete, moderate, stiffly held; buds rather large, sometimes stalked or superposed, the terminal bud much larger than the laterals, ovoid or oblong, with one to several exposed scales; leaf scars alternate, shield shaped or 3-lobed, large, low, with numerous bundle traces in about three more or less definite groups, and without stipule scars.

| species     | bud<br>scales                | fruit<br>with<br>winged<br>sutures | nut<br>shell | leaflet                           | nut   | winter<br>buds   | nut<br>husk                             | leaves                              | bark                   | leaves &<br>petioles                     | twig<br>color                        |
|-------------|------------------------------|------------------------------------|--------------|-----------------------------------|---|--|---|-------------------------------------|------------------------|--|--------------------------------------|
| pecan       | 4-6<br>valvate               | with<br>winged<br>sutures          | thin         | 7-17<br>falcate                   | elongated<br>terete,<br>shell thin,<br>sweet      | slender,<br>elongated                                  | splitting<br>to base,<br>thin           |                                     |                        | tomentose,<br>glandular<br>when<br>young |                                      |
| cordiformis | 4-6<br>valvate               | with<br>winged<br>sutures          | thin         | 5-9<br>falcate                    | compressed<br>broad as<br>long,<br>bitter         | stout,<br>glandular,<br>bright<br>yellow               | splitting<br>to below<br>middle         |                                     |                        |  |                                      |
| laciniosa   | imbricate,<br>more<br>than 6 | sutures<br>not<br>winged           | thick        | not<br>falcate<br>leaflets<br>7-9 |   | outer<br>scales<br>persistent                          | splitting<br>to base                    | with<br>7-9<br>leaflets             | shaggy                 | glabrous<br>or<br>pubescent              | pale<br>orange                       |
| ovata       | "                            | "                                  | "            | not<br>falcate<br>leaflets<br>5   |   | "  | very thick<br>splitting<br>to base      | with 5<br>leaflets                  | shaggy                 | "  | gray<br>to<br>light<br>red-<br>brown |
| tomentosa*  | "                            | "                                  | "            | not<br>falcate                    | angled,<br>kernel<br>sweet                        | outer<br>scales<br>deciduous;<br>bud large<br>1-1 1/2" | not<br>splitting<br>to base             | 5-7<br>leaflets                     | firm,<br>not<br>shaggy | tomen-<br>tose                           |                                      |
| glabra      | "                            | "                                  | "            | "                                 | slightly<br>or not<br>angled,<br>kernel<br>bitter | small<br>1-1 1/2"                                      | thin,<br>splitting<br>only to<br>middle | 5, rarely<br>7 leaflets<br>glabrous | firm,<br>not<br>shaggy | glabrous                                 |                                      |

The Genus *CASTANEA* is recognized in

**SUMMER** : leaves alternate, simple, straight-veined, oblong, rather acuminate to acute, coarsely serrate with bristle-like teeth; nuts enclosed in a prickly bur formed by the involucre; nuts terete; staminate flowers in slender aments.

**WINTER** : by the moderate, stiff, more or less fluted twigs with a continuous star-shaped pith; bark gray, fissured, with smoothish ridges; buds ovoid, sessile, oblique, with 2-3 exposed scales; leaf scars alternate, scarcely raised, moderate to small in size,  $\frac{1}{2}$ -round, with 3 bundle traces and with elongated, unequal stipule scars; twigs olive brown, polished or hairy.

| species           | nuts   | habit   | branchlets      | leaves  | twigs                 |
|-------------------|--|---------|-----------------|---|-----------------------|
| <i>pumila</i>     | higher than broad, solitary in a spiny involucre | shrubby |                 | elliptic-oblong, tomentose beneath                    | tomentose             |
| <i>dentata</i>    | broader than high, 2 or more in one involucre    | tree    | glabrous        | oblong-lanceolate, glabrous, base cuneate             | olive-brown, polished |
| <i>mollissima</i> | "  | "       | short pubescent | elliptic-oblong, soft pubescent beneath, base rounded | dull, hairy           |

Summer and Winter Keys combined --- *CASTANEA*

The Genus *CARPINUS* is recognized in

**SUMMER** : leaves deciduous, alternate, simple, pinnately veined with 7-24 pairs straight veins, with the base symmetrical and the margin doubly toothed, more or less 2-ranked; fruit a small, ribbed nutlet enclosed in a 3-pronged involucre; fruits in a spike-like, drooping cluster.

**WINTER** : bark smooth and firm, muscular appearing; twigs slender, zigzag; buds solitary, 2-ranked, acute, with many imbricate scales in 4 rows.

| GENUS           | bark                               | bud scales             | leaves   | staminate catkins   | involucre                |
|-----------------|------------------------------------|------------------------|--|---------------------|--------------------------|
| <i>Carpinus</i> | smooth and firm                    | in 4 rows, not striate | ovate-oblong, glabrous except veins pilose beneath and with axillary tufts of hair | appearing in spring | 3-cleft, leafy           |
| <i>Ostrya</i>   | rough and shredding in long strips | in 2 rows, striate     | ovate to ovate-oblong, larger, sparingly hairy above and below                     | formed in autumn    | a bladderlike closed bag |

Summer and Winter Keys combined

*CASTANEA* --- *CARPINUS*

The Genus CATALPA is recognized in

**SUMMER** : leaves very large, simple, ovate, long-petioled, with an acute to acuminate tip and entire margin, 3-5 veined at the base, usually with a purplish glandular spot in the vein-axils beneath; flowers white or yellowish in large, showy panicles; fruit a long, terete, 2-valved pod with thin, ciliate seeds wrapped around a central partition.

**WINTER** : twigs coarse, yellow to yellow-gray; leaf scars whorled, elliptical, raised, with many bundle traces arranged in an ellipse; buds comparatively small, solitary and sessile, with 6 or more loose, pointed scales; terminal bud lacking; fruits persistent.

| species                        | habit                         | flowers                    | leaf form  | leaf tip                      | seed wings   | fruits                            | branches                              |
|--------------------------------|-------------------------------|----------------------------|--|-------------------------------|--------------|-----------------------------------|---------------------------------------|
| bungei (or big-nonioides nana) | low, formal mound-top grafted | white in corymbose racemes | triangular-ovate, glabrous beneath                   | long-acuminate, base truncate |              |                                   |                                       |
| ovata*                         | tall, loose spreading tree    | yellowish                  | broad-ovate, 3-5 lobed, nearly glabrous              |                               |              | long, very slender, 1/8" diameter | glabrous                              |
| bignonioides                   | "                             | white, glabrous            | not or seldom lobed, ovate, pubescent on veins below | abruptly acuminate            | pointed ends | long, slender 1/4" diameter       | light brown, crooked and straggling   |
| speciosa                       | "                             | "                          | not or seldom lobed, ovate, densely pubescent below  | long acuminate                | rounded ends | coarser, 1/2" diameter            | red-brown, not crooked and straggling |

Summer and Winter Keys combined --- CATALPA

**CEDRELA SINENSIS** : is distinguished in

**SUMMER** : leaves alternate, pinnately compound, eglandular, stipular, long petioled; leaflets 10-20, short-stalked, oblong to lance-oblong, acuminate, remotely serrate or entire, pubescent on the veins at first, becoming glabrous; flowers small, whitish, in large pendulous panicles; fruit an obovoid capsule with winged seeds.

**WINTER** : tree with smoothish or shredding bark; twigs coarse, terete, puberulous when young, with a large, rounded pith which is white at first becoming brownish; leaf scars large, alternate, heart-shaped, slightly raised, with 5 bundle traces and no stipule scars; buds solitary, sessile, subglobose, with 4 or more short pointed scales; end-bud much larger.

This tree is very similar to Ailanthus but easily distinguished therefrom by the large end-bud and by the absence of glands at the base of the leaflets.



The Genus *CELTIS* is recognized in

**SUMMER** : tree with a rough, corky, light gray bark; leaves simple, alternate, thin and rough to touch, serrate, with 3 main veins at the base; fruit a small, globular drupe, with a date-like flavor; pith somewhat angular, occasionally chambered.

**WINTER** : unarmed; bark light gray, corky; twigs slender, zigzag, brownish, odorless; terminal bud lacking; leaf scars alternate, small, with one bundle trace (or appearing as one); pith rather angular, chambered in places; buds small, appressed, somewhat triangular.

| species             | bark                            | buds  | leaves  | fruit pedicel            |
|---------------------|---------------------------------|-------|---|--------------------------|
| <i>occidentalis</i> | with thick, corky, curly ridges | long  | ovate to ovate-oblong, subcordate, sharply singly serrate, acuminate          | longer than the petiole  |
| <i>laevigata</i> *  | with corky warts                | short | ovate to oblong-lanceolate, almost entire, long acuminate, base broad cuneate | shorter than the petiole |

*CERCIDIPHYLLUM JAPONICUM* is distinguished in

**SUMMER** : leaves opposite, simple, petiolate, suborbicular, obtusish, cordate, palmately veined, dark bluish-green above, glaucous beneath, margin crenate-serrate; twigs swollen at the nodes by the much raised leaf cushions.

**WINTER** : a small tree; twigs glabrous, much enlarged at the nodes; leaf scars opposite or 4-ranked, crescent-shaped, raised, with 3 bundle traces and no stipule scars; buds often developing short spurs, moderate, solitary, oblong, pointed, appressed, with one exposed scale.

*CERCIS CANADENSIS* is distinguished in

**SUMMER** : leaves alternate, simple, suborbicular, cordate, petiolate, entire, palmately veined, with small caducous stipules; flowers fascicled, before the leaves, rosy-pink, pealike, adventitious; fruit a flat legume, narrowly winged on the ventral suture.

**WINTER** : shrub or small tree; bark very dark with reddish fissures; twigs blackish, zigzag, pith rounded, continuous; leaf scars alternate, 2-ranked, somewhat raised, obtusely triangular, fringed at the top, with decurrent ridges, having 3 bundle traces and no stipule scars; buds glabrous, superposed, the upper stalked, the lower sessile, ovoid or obovoid, with 2 to several often keeled scales; end-bud lacking, flower buds adventitious.

*CLADRASTIS LUTEA* is distinguished in

**SUMMER** : leaves alternate, pinnately compound, estipular; leaflets alternate, short-stalked, rather large, elliptic to ovate, entire, short acuminate; petiole swelled to cover the bud; branchlets red-brown.

**WINTER** : tree with smooth bark and yellow wood; twigs red-brown; leaf scars alternate, almost encircling the bud, 2-ranked, C-shape, with 3-5 bundle traces and no stipule scars; buds naked, silky brown hairy, in aggregates resembling single buds, sessile.

*CELTIS* -- *CERCIDIPHYLLUM* -- *CERCIS* -- *CLADRASTIS*



The Genus CORNUS (tree forms) is recognized in

**SUMMER** :leaves opposite, simple, entire, with the veins parallel, curving, and anastomosing, petiolate. (N.B. one species shows alternate arrangement); floral parts in fours; fruit a small drupe

**WINTER** : by the rather slender twigs, terete, with a white, continuous pith; leaf scars opposite except in *C. alternifolia*, connected around the twig, crescent or V-shaped, raised on young wood, with 3 bundle traces and no stipule scars; buds solitary, stalked, oblong, with two scales valvate or nearly so; flower buds conspicuous for size and shape.

#### Summer Key

| species             | arrangement | fruit                               | flower-heads   | leaves  |
|---------------------|-------------|-------------------------------------|--|---|
| <i>alternifolia</i> | alternate   | blue-black, bloomy, on red pedicels | terminal, loose, flat cymes, without an involucre                          | with 5-6 pairs veins, base cuneate, margin entire   |
| <i>mas</i>          | opposite    | red                                 | opposite, terminal or axillary dense umbels, with involucre flowers yellow | green beneath, glabrous                             |
| <i>florida</i>      | opposite    | red                                 | dense terminal cymes with showy white involucre notched at tip             | whitened beneath                                    |
| <i>kousa</i>        | opposite    | red, connate in globose head        | dense terminal cymes with showy white involucre pointed at tips            | glaucous beneath with large axillary tufts of hairs |

#### Winter Key

| species             | leaf scars      | leaf buds                     | flower buds                   | leaf axils      | branchlets            |
|---------------------|-----------------|-------------------------------|-------------------------------|-----------------|-----------------------|
| <i>alternifolia</i> | alternate       |                               |                               |                 | glabrous, greenish    |
| <i>kousa</i>        | opposite        | concealed in leaf scars       | enlarged                      | brown hairy     |                       |
| <i>florida</i>      | opposite raised | concealed in leaf scars       | enlarged flattened lengthwise | not brown hairy | reddish on upper side |
| <i>mas</i>          | opposite        | not concealed, very divergent | enlarged, ovate to obovate    |                 |                       |

The Genus CRATAEGUS is distinguished in

SUMMER : thorns long, stiff, sharp-pointed; leaves simple, alternate, stipulate, toothed or lobed; flowers in corymbs; fruit a pome-like drupe, with 1-5 bony nutlets.  
WINTER : thorns long, stiff, sharp-pointed; buds short, stout, hard, with fleshy red scales.

| species     | leaves  | fruit  | veination                              | leaf edge                            | lobes                    | petioles                    | anthers               | thorns                     |
|-------------|---|--|--|--------------------------------------|--------------------------|-----------------------------|-----------------------|----------------------------|
| phaenopyrum | deltoide, subcordate, subcoriaceous, with 3-5 lobes, glabrous lobed, broad ovate to obovate, cuneate glabrous, yellow-green beneath | scarlet, with 5 nutlets, small corymbose                             | to points of lobes & sinuses           | sharply serrate                      | 3-5                      |                             |                       | long, slender              |
| oxyacantha  | to obovate, cuneate glabrous, yellow-green beneath  | red, subglobose, with 1-2 nutlets                                    | lower or secondary veins               | broadly serrulate                    | 3-5 deep-cut             |                             |                       | short or lacking           |
| monogyna    | lobed, broad ovate to obovate, blue-green beneath   | ellipsoid, with 1 nutlet   | curved in secondary veins              | entire or few-teeth                  | 3-7 or more              |                             |                       | "                          |
| crusgalli   | oval to obovate, not lobed, thick & leathery, very glossy, cuneate  | dull red, subglobose, glabrous without cavities and on the 2 nutlets | to points of lobes and teeth not       | sharply serrate except near the base | not lobed                | short                       |                       | moderate, numerous, curved |
| punctata    | obovate or oval, cuneate, dotted, dull surfaced   | dotted red, ellipsoid, with 3-5 nutlets                              | impressed, irregularly villous " below | " serrate                            | not or very little lobed | short, irregularly margined | inflorescence villous | stout & short or wanting   |
| succulenta  | broad-elliptic, not lobed, cuneate lustrous   | subglobose, bright red with 3 nutlets                                | "                                      | coarsely doubly serrate              | "                        | long & slender              | rose-color            | long, stout                |
| coccinea    | ovate, lobed, large acute, cuneate  | globose, scarlet red, pulpy, pubescent, 3-4 nutlets                  | "                                      | sharply doubly serrate               | regularly lobed          | moderate                    | yellow                | stout, curved              |

Summer and Winter Keys combined -- CRATAEGUS

DIOSPYROS VIRGINIANA is recognized in

SUMMER : leaves alternate, long, elliptic, drooping, entire, stipulate; petioles moderate to short; flowers dioecious, regular, axillary, inconspicuous; fruit a several seeded berry with the calyx persistent, seeds flattened.  
WINTER : bark checkered; young branchlets pubescent or glabrous; twigs moderate, terete, yellow-gray to red-brown, lenticular; pith moderate, greenish-white; buds ovoid, flattened, with 2-3 overlapping scales, solitary, sessile; terminal bud lacking.

CRATAEGUS

DIOSPYROS

The Genus FAGUS is distinguished in

SUMMER : bark smooth, gray; leaves alternate, simple, green beneath, 2-ranked, plicate in the bud, with strong, straight veins parallel and ending each in a tiny tooth; flowers of two kinds, the staminate in heads, the pistillate paired in a 4-parted involucre; fruit a triangular nut, in pairs in a prickly 4-parted involucre.

WINTER : bark silver-gray, smooth; buds slender, golden-brown, cigar-shaped.

#### Summer Key

| species            | veination        | leaf edge            | fall color    | bark                  | color of veins and petioles | leaves                   |
|--------------------|------------------|----------------------|---------------|-----------------------|-----------------------------|--------------------------|
| grandifolia*       | 9-14 pairs veins | coarsely serrate     | yellow-bronze | very light gray       | green                       | ovate-oblong, acuminate  |
| sylvatica          | 5-9 pairs veins  | remotely denticulate | red-bronze    | medium gray           | green                       | ovate or elliptic, acute |
| sylvatica purpurea | 5-9 pairs veins  | denticulate          | red-bronze    | deeper, purplish gray | red                         | "                        |

#### Winter Key

| species            | twigs     | buds  | bud color              | bark                |
|--------------------|-----------|---|------------------------|---------------------|
| grandifolia*       | glabrous, | lustrous, elongated, with about 8 pairs of scales | yellow-brown, lustrous | light gray          |
| sylvatica          | villous   | slightly puberulent                               | red-brown, silky dull  | deeper, medium gray |
| sylvatica purpurea | villous   | puberulent, moderate                              | deeper, red-brown      | deep gray           |

The Genus *FRAXINUS* is distinguished in

**SUMMER** : trees with opposite, pinnately compound leaves, the margin toothed but not lobed; flowers small, in crowded panicles from the axils of last year's leaves; fruit a small nutlet with an elongated wing at the top.

**WINTER** : twigs stout, stiff, widely divergent; leaf scars rather large, opposite,  $\frac{1}{2}$ -round to almost elliptical, with numerous bundle traces in an elliptical or C-shaped group and with no stipule scars; buds sessile, sometimes superposed, with 1-2 pairs of opposite scales.

#### Summer Key

| species              | twigs        | lateral leaflets                              | rachis                     | parts           | leaves beneath                       | leaf edge                         |
|----------------------|--------------|---|----------------------------|-----------------|--------------------------------------|-----------------------------------|
| <i>quadrangulata</i> | 4-angled     | 7-11  |                            |                 |                                      |                                   |
| <i>nigra</i>         | not 4-angled | 7-11, oblong, sessile                         | with thick rufous tomentum |                 | rusty-tomentose along the midrib     | serrate with small incurved teeth |
| <i>excelsior</i>     | not 4-angled | 7-11, sessile                                 | without rufous tomentum    | glabrous        | glabrous or pubescent on midrib only | serrate                           |
| <i>pennsylvanica</i> | not 4-angled | ovate to oblong-lanceolate, 5-9, petiolate    | not winged                 | rusty-pubescent | pubescent beneath                    |                                   |
| <i>lanceolata</i>    | not 4-angled | elliptic-oblong, to lanceolate 5-9, petiolate | not winged                 | glabrous        | glabrous, as green as the upper side | finely, sharply serrate           |
| <i>americana</i>     | not 4-angled | ovate, slender-petioled, 5-9                  | not winged                 | glabrous        | pale, glaucous                       | obscurely serrate or entire       |

#### twigs, petioles, veins, and buds

#### Winter Key

| species              | twigs        | buds                            | twig near tip       | bud scales                  | bark              | leaf scars                | inner bark            |
|----------------------|--------------|---------------------------------|---------------------|-----------------------------|-------------------|---------------------------|-----------------------|
| <i>quadrangulata</i> | 4-angled     |                                 |                     |                             |                   |                           |                       |
| <i>excelsior</i>     | not 4-angled | black or nearly black           |                     |                             |                   |                           | turns water blue      |
| <i>pennsylvanica</i> | not 4-angled | rusty tomentose, pointed at tip | densely pubescent   |                             |                   |                           |                       |
| <i>nigra</i>         | not 4-angled | not tomentose, dark brown       | not downy           | 3 pairs with apex apiculate |                   | concave on top edge       | inner surface reddish |
| <i>lanceolata</i> *  | not 4-angled | brown                           | not downy           | 4 pairs with rounded apex   | ridged, not flaky | straight on top edge      | yellowish             |
| <i>americana</i>     | not 4-angled | brown, very blunt at tip        | not downy, lustrous | 4 pairs with rounded apex   | ridged, not flaky | upper edge deeply concave |                       |

GINKGO BILOBA is recognized in

SUMMER : leaves alternate, clustered on short spurs, fan-shaped, slender petioled, more or less incised at the tip, striated by the parallel veins.

WINTER : branches irregularly placed and without lateral twigs near the tips; twigs yellow-gray, moderate, rounded; leaf scars alternate, crowded on short spurs, crescent-shaped, low, with 2 bundle traces and no stipule scars; buds brown, solitary, sessile, hemispherical with three or more scales.

GLEDITSIA TRIACANTHOS is recognized in

SUMMER : a large tree armed with stout, much branched spines which persist on the trunk; leaves alternate, often fascicled, pinnate or bi-pinnate on the same tree; leaflets small, obtusish, elliptic to oblong-lanceolate, entire; flowers in small, greenish racemes, inconspicuous; fruit a long, twisted, red-brown legume, indehiscent, many-seeded.

WINTER : spines numerous and much-branched, very large; twigs zigzag, moderate, with swollen nodes; leaf scars comparatively large, irregularly shield-shaped, rimmed red and appearing sore and inflamed; buds glabrous, sessile, superposed, often more or less covered by the torn margin of the leaf scar, with few scales; end-bud lacking.

GYMNOCLADUS DIOICUS is recognized in

SUMMER : leaves alternate, doubly pinnately compound, very large; leaflets ovate, of medium size, acute, rounded at the base, short-stalked, entire; flowers of two kinds, greenish and inconspicuous; fruit a short, thick and broad, beanlike pod, with several suborbicular seeds.

WINTER : tree, unarmed, with stout branches and a gray bark which appears as though of many small flakes rolled up on one edge; twigs thick, glossy, brown overcast with white as if painted, and with small lenticels; buds minute, superposed, set in tiny, silky craters, removed from the leaf scar as much as 1/8" or more; leaf scars alternate, large, irregularly heart-shaped, little raised, with 3-5 large, rather indefinite bundle traces and sometimes with minute stipule scars fringed at the top.

HALESIA CAROLINA \* is recognized in

SUMMER : a large shrub or small tree with the bark shredding and marked by whitish fissures; leaves alternate, simple, elliptic to ovate-oblong, finely serrate, acute or acuminate, base cuneate or rounded, stipular, tomentose at first, becoming glabrous above but remaining pubescent below; flowers white, often tinged pink, bell-shaped, puberulous, pendulous in axillary clusters on last year's wood; fruit an obovoid-oblong dry drupe with four longitudinal wings and with the tip elongated in a point.

WINTER : bark gray or brown-gray marked with whitish fissures; twigs moderate, with a stellate-scurfy bark which shreds off in fine, hairlike threads; pith smallish, terete, white, finally chambered; leaf scars alternate, moderate, somewhat raised,  $\frac{1}{2}$ -round, notched, with one crescent-shaped bundle trace and no stipule scars; buds moderate, superposed, ovoid, with about four fleshy red scales.

GINKGO      --      GLEDITSIA      --      GYMNOCLADUS      --      HALESIA



The Genus JUGLANS is distinguished in

**SUMMER** : leaves alternate, pinnately compound, estipulate, with numerous, opposite leaflets, aromatic, serrate or entire; monoecious flowers in catkins, the staminate lateral and drooping, the pistillate in terminal racemes in the axils of bracts; fruit a nut with an indehiscent husk.

**WINTER** : trees with stout, more or less fluted twigs; pith chambered with rather close, thin plates; leaf scars alternate, rather large, shield-shaped or three lobed, raised, with 3 compound bundle traces and no stipule scars; buds moderate, sessile, velvety, with few scales, superposed, the terminal bud much larger than the lateral ones.

# Winter Key

| species     | bark                                | pith            | terminal bud | leaf scar   | twigs                          | buds      | pith diaphragms         |
|-------------|-------------------------------------|-----------------|--------------|---|--------------------------------|-----------|-------------------------|
| cinerea     | light gray with wide smooth margins | chocolate brown | elongated    | with a downy ridge, not notched                       | moderate, pubescent, glandular | slender   |                         |
| sieboldiana | dark, with rough ridges             | creamy          | elongated    | with a downy ridge, and notched without a downy ridge | very stout                     | stout     |                         |
| nigra       | "                                   | "               | short        | "   | gray-pubescent                 | canescent | close together          |
| regia       | light gray, smooth                  | "               | "            | "   | glabrate                       | glabrate  | widely spaced (5 to 1") |

# Summer Key

| species     | leaflets                                   | pith diaphragms | terminal leaflet    | fruit surface | nut   | pith color      |
|-------------|--|-----------------|---------------------|---------------|---|-----------------|
| regia       | entire or nearly so, glabrous, 7-9 serrate | widely spaced   |                     | glabrous      | wrinkled but not rough, with thin partition | creamy          |
| nigra       | serrate                                    | closely spaced  | often not developed | glabrous      | ridged, rough, with thick, bony partition   | creamy          |
| sieboldiana | "  | "               | well developed      | sticky-hairy  | rugose or nearly smooth                     | creamy          |
| cinerea     | glandular, pubescent, with spreading teeth | "               | "                   | "             | elongated, ridged rough                     | chocolate brown |



KALOPANAX PICTUS is recognized thus

SUMMER : a tree with stout, prickly branches; leaves alternate, simple, palmately veined and lobed, suborbicular, 5-7 lobed, with very long petioles, lobes acuminate and serrate; flowers small, whitish, in umbels; fruit a 2-seeded drupe, subglobose, bluish-black.

winter ; tree with coarse branches and thick twigs, armed with numerous short, stout prickles, these found both on nodes and internodes; twigs terete, often forming spurs; pith moderate, large, continuous, white; leaf scars alternate, narrowly crescent-shaped or U-shaped, somewhat raised, with 5 small bundle traces and no stipule scars; buds solitary, sessile, conical-ovoid, with about three, exposed, thin scales.

KOELREUTERIA PANICULATA is recognized thus

SUMMER : an unarmed small tree; leaves alternate, pinnately or bi-pinnately compound; leaflets 7-15, serrate, hairy, occasionally glabrous, coarsely and irregularly crenate-serrate, at the base often incisedly lobed; flowers yellow, small, in large, loose panicles in midsummer; fruit an oblong-ovoid, 3-valved, bladder capsule with papery walls and with 3 roundish, black seeds.

WINTER : twigs moderate, orange-brown, lenticular; pith rounded, continuous, white; leaf scars alternate, raised, rather large, shield-shaped, with 3 compound bundle traces or a jagged, irregular series, and without stipule scars; buds moderate, solitary,  $\frac{3}{4}$ -ellipsoid, sessile, set at almost right angles to the twig, and with 2 exposed scales; end-bud lacking.

LABURNUM ANAGYROIDES\* is recognized thus

SUMMER : leaves alternate, palmately compound, with 3 leaflets, petiolate; leaflets elliptic-obovate, ciliate with silky hairs, subsessile, obtuse, broadly cuneate; flowers yellow, in pendulous terminal racemes, pealike; fruit a legume, with a thick keel, appressed-pubescent, compressed, dehiscent.

WINTER : twigs slender, green, appressed-pubescent, terete, or slightly fluted; leaf scars alternate or rarely opposite, small, elevated, transversely elliptical, with 3 bundle traces confluent or indistinct, and the stipules persistent on the leafy cushion; buds moderate, solitary, sessile, silvery silky-hairy, ovoid, with 2-4 outer scales scarred at the top.

The Genus *MALUS* is distinguished thus

SUMMER : trees without true spines but with often thornlike spurs; leaves alternate, simple, sometimes lobed, toothed on the margin, with small, soon falling stipules; flowers regular, in umbel-like clusters; fruit a fleshy pome.

WINTER : twigs moderate, rounded, somewhat spinescent, usually dull, deep red in color; leaf scars alternate, raised, or the nodes swollen below them, linear or U-shaped, with 3 bundle traces and no stipule scars; buds moderate, solitary, sessile, with about 4 exposed scales slightly keeled above and imbricate, end-bud sometimes lacking.

| species           | leaves in bud | calyx      | calyx lobes  | styles                      | pedicels              | leaves  | flowers   | fruit                                   |
|-------------------|---------------|------------|--|-----------------------------|-----------------------|---|---|---|
| pruni-<br>folia   | rolled        | persistent | longer than tube<br>acuminate                      |                             |                       | dull, sharply<br>serrate  | calyx with a<br>fleshy base   | ovoid<br>apex<br>attenuate              |
| specta-<br>bilis  | "             | "          | shorter than tube,<br>acute                        |                             | pubescent             | lustrous, broad<br>crisp, cuneate   | calyx<br>pubescent  | slender<br>stalked,<br>cuneate          |
| baccata           | "             | deciduous  | longer than tube,<br>narrow-lanceolate             | 5 rarely 4                  | glabres-<br>cent      | glabrous above,<br>lustrous, serrate  | white, buds<br>cherry-red   | "                                       |
| halli-<br>ana     | "             | "          | shorter than tube,<br>triangular-ovate<br>obtusish | 4-5                         | glabrous,<br>purplish | margins closely<br>serrate or entire  | white or pink   | "                                       |
| sykes-<br>tris    | folded        | persistent | tomentose,<br>reflexed                             | 5 villous<br>at base        | " or less             | tomentose below,<br>closely<br>crenate-serrate                                    |   | small,<br>pyri-<br>form                 |
| loensis           | "             | "          | tomentose, erect<br>or spreading                   | "                           | 1" or<br>more         | tomentose below<br>lobed or strongly<br>veined, doubly<br>serrate                 |   | usually<br>large                        |
| angusti-<br>folia | "             | "          | glabrous   | 5 villous<br>at base        | slender               | hard, thin, oblong<br>glabrous, obtusish<br>crenate-serrate                       |   | green,<br>fleshy,<br>greasy<br>fragrant |
| coron-<br>aria    | "             | "          | "  | "                           | "                     | ovate, hard, thin,<br>acute, doubly ser-<br>rate, often lobed                     | pink, very<br>fragrant  | "                                       |
| torin-<br>goides  | "             | deciduous  | glabrous without,<br>puberulent within             | 3-4, glabrous<br>dull red   | slender               | undivided or<br>partly 3-lobed  |   |   |
| flori-<br>bunda   | "             | "          | glabrous or<br>puberulent                          | 4, connate<br>to middle     | glabrous              | never lobed, base<br>cuneate, ovate or<br>oblong, acute, irre-<br>gularly serrate | intense car-<br>mine in bud,<br>red or orange-<br>yellow<br>first to bloom<br>1/4 diam. | red or<br>yellow,<br>small              |
| arnold-<br>iana   | "             | "          | "  | "                           | "                     | "   |   | very small                              |
| schied-<br>eckeri | "             | "          | "  | "                           | "                     | "   |   | red or<br>orange-<br>yellow             |
| sargen-<br>ti     | "             | "          | pubescent  | "                           | pubescent             | sharply serrate,<br>pubescent below   |   | medium,<br>yellow,<br>1/4 diam.         |
| zumt              | "             | "          | glabrous without<br>pubescent within               | villous base<br>and connate | glabrous              | often lobed, ser-<br>rate, habit low,<br>spreading                                | suborbicular<br>petals, pink<br>fading except<br>margins                                | red, very<br>dark                       |
| sie-<br>boldi     | "             | "          | "  | "                           | "                     | entire, only up-<br>per lobed   | pink, base of<br>petals cuneate,<br>sepals long   |   |
|                   | "             | "          | "  | "                           | "                     | all lobed and<br>serrate  | petals pink,<br>cuneate; sepals<br>shorter or long<br>as tube                           |   |

*MALUS*

The Genus MORUS is recognized thus

SUMMER : leaves alternate, simple or variously lobed, coarsely toothed, with 3-5 veins at the base, broadly ovate, with lanceolate, deciduous stipules; flowers in stalked, axillary, drooping catkins; fruit an aggregate of drupelike achenes, resembling a blackberry, sweet, edible.

WINTER : trees with a scant, milky sap; twigs moderate, terete, with a continuous pith; leaf scars alternate, round or half-round or rather triangular, slightly raised, with numerous bundle traces scattered or in an ellipse, and with narrow stipule scars, of which the one below the bud is the larger; buds sessile, solitary or collaterally multiple, ovoid, oblique, with about 3-6 2-ranked thin scales; end-bud lacking.

| species | leaves   | buds  | leaf base                    | bark                            | fruit                   | habit          |
|---------|--|---|------------------------------|---------------------------------|-------------------------|----------------|
| alba    | smooth above with axillary hairs beneath, thin, glossy     | triangular, ovoid, short, buff yellow, scales uniformly colored     |                              | yellow to orange                | white, pink or purplish | spreading tree |
| rubra   | scabrous above, pubescent beneath closely, sharply serrate | buds more elongated, somewhat spreading, green scales dark-margined | truncate or slightly cordate | darker, twigs often downy above | ovoid to oblong         | to tree        |

MYRICA CERIFERA : see key for Myrica in shrub section.

NYSSA SYLVATICA : is recognized thus

SUMMER : tree; leaves alternate, simple, obovate or oblong, entire, acute or obtusish, cuneate, lustrous above, glaucescent beneath, glabrous; flowers inconspicuous, small, greenish on hairy peduncles, polygamo-dioecious, in axillary clusters; fruit an oblong-ovoid, blue drupe.

WINTER : mature branches spreading horizontally; twigs moderate, terete, glabrescent to glabrous; pith white, continuous, crossed by diaphragms; leaf scars alternate, broadly crescent-shaped or triangular, sometimes becoming U-shaped by rupture of a tegument, with 3 bundle traces and no stipule scars.

OSTRYA VIRGINIANA is recognized thus

SUMMER : leaves medium sized, oblong-ovate to ovate, alternate, simple, pinnately veined, subcordate base, margin doubly serrate; flowers without perianth, the staminate pendulous, with 3-14 stamens, the pistillate aments, upright; fruit a ribbed nutlet in a bladderlike involucre with stiff hairs at the base, in a pendulous raceme.

WINTER : small tree with brown scaly bark which peels in long strips; twigs slender, zigzag, with pale pith; leaf scars alternate, 2-ranked, slightly raised, small, crescent-shaped or  $\frac{3}{4}$ -elliptical, with 3 bundle traces and with elongated, unequal stipule scars; buds ovoid, pointed, with many imbricate scales in two rows, sessile, solitary, rarely superposed, oblique, end-bud lacking.

PAULOWNIA TOMENTOSA\* is recognized thus

SUMMER : tree; leaves opposite or whorled, large, ovate, palmately veined, hairy beneath, petiole often hollow, upper side pubescent, with minute cup-shaped glands at the base of the veins; flowers violet, in large panicles, fragrant; fruit an ovate, pointed capsule.

WINTER : twigs stout, resembling Catalpa, compressed at nodes; pith large, white, terete, chambered or excavated in the internodes; leaf scars opposite, subelliptical, more or less notched at top, raised, with many bundle traces in an almost completed ellipse, and no stipule scars.

The Genus *PHELLODENDRON* is recognized thus

**SUMMER :** by the opposite arrangement; leaves pinnately compound, with opposite, crenulate leaflets, punctate with pellucid dots, aromatic with a turpentine-like odor; buds concealed in the base of the petiole; flowers dioecious, small, greenish, in terminal panicles or corymbs.

**WINTER :** aromatic trees; bark yellow when cut; twigs moderate, terete, with a brown, continuous pith; leaf scars opposite or almost opposite, horseshoe shaped, raised, medium large, with 3 bundle traces which may be compound, and no stipule scars, naked, solitary, sessile, lustrous silky red-brown, the silky hairs covering the overlapping of the two scales, flattened vertically and almost surrounded by the leaf scar.

#### Summer Key

| species      | margin                   | upper side of leaves | under side         | base of leaflets                | leaf rachis                             | inflorescence   |
|--------------|--------------------------|----------------------|--------------------|---------------------------------|---|-----------------|
| amurense     | ciliate                  | lustrous             | glabrous, glaucous | rounded                         |   | puberulous      |
| sachalinense | not or sparingly ciliate | dull                 | glabrous           | cuneate or rounded              |   | glabrous        |
| japonicum    |                          | dull                 | gray-villous       | truncate or subcordate, oblique | densely tomentose, leaves broadly ovate | hoary-tomentose |

#### Winter Key

| species      | twig color | lower bark                  | twig texture | fruit clusters                  |
|--------------|------------|-----------------------------|--------------|---------------------------------|
| amurense     | orange     | thick, corky, light gray    | glabrous     |                                 |
| sachalinense | red-brown  | thin, not corky, dark brown | glabrous     | branched, winter buds red-downy |
| japonicum    | red-brown  | thin, not corky, dark brown | pubescent    | distinctly branched             |

The Genus PLATANUS is recognized thus  
 summer : arrangement alternate; leaves large, palmately 3-5 lobed, coarsely and acutely toothed;  
 long petioled with the buds concealed in the base of the petiole, the stipules sheathing  
 with the petiole margin; fruits in globose, long-stalked aggregates.

WINTER : large trees with the bark exfoliating in large, thin plates; twigs moderate, terete, glabrous, buff colored, zigzag, with a continuous pith; leaf scars alternate, 2-ranked, raised, scalloped, and completely encircling the buds, with 5 or more rather large bundle traces, and narrow stipule scars encircling the twig; buds solitary, sessile, large, conical, with a single closed scale; the end-bud lacking.

Summer and Winter Keys combined (fruit and bark constitute winter identification)

| species      | fruit heads                                       | leaves  | sinus    | seeds   | leaf edge           | base                         | bark   | petioles  |
|--------------|---|---|----------|---------|---------------------|------------------------------|--|---|
| orientalis   | racemose,<br>3 or more per<br>pedicel,<br>bristly | usually with<br>5 main veins,<br>seldom 3   | deep-cut | pointed | dentate             | wedge or<br>heart-<br>shaped | scales very<br>freely, greenish-<br>white                                | green   |
| acerifolia   | two, race-<br>mose, bristly<br>(rarely 3)         | 3-5 lobes, the<br>middle lobe<br>about as long<br>as broad                            | moderate |         | coarsely<br>toothed | truncate                     | scales freely  | greenish<br>white,<br>mottled<br>young growth<br>densely brown<br>tomentose |
| occidentalis | usually<br>solitary,<br>smoothish                 | with 3 main<br>veins (rarely<br>5), downy be-<br>neath, lobes<br>longer than<br>broad | shallow  | blunt   |                     | deeply<br>cordate            | scales less freely<br>hardly at all<br>from young trees,<br>almost white |   |



The Genus **POPULUS** is recognized thus

**SUMMER** : trees with a furrowed, light colored bark and rounded or angled twigs, and resinous buds, the terminal bud usually present; leaves alternate, long-stalked; petioles usually flattened, the ovate, triangular or rhomboid in shape, margin dentate or serrate; flowers in pendulous catkins before the leaves;; fruits ripening before leaves are fully out.

**Summer Key**

| species       | under side of leaves    | buds      | leaf form | leaf border | petioles                     | leaves   | branches           | leaf margin   | leaf base                                    |
|---------------|-------------------------|-----------|-----------|-------------|------------------------------|--|--------------------|---|--|
| alba          | white or gray tomentose | tomentose | lobed     | not         |                              |  |                    |   |  |
| simoni        | glabrous waxy           | glabrous  | not       | translucent | terete, long compressed      | rhombic-ovate to obovate, glabrous broadly deltoid-ovate       | angled             | crenate-serrulate   | cuneate                                      |
| deltoides     | glabrous                |           |           |             |                              |  | not "              | coarsely crenate-serrate, teeth curved                          | truncate, entire                             |
| tremuloides   | "                       | "         | "         | "           | "                            | ovate to orbicular, short acuminate, small, thin, less than 3" | "                  | finely glandular-serrate  | cordate or subcordate                        |
| grandidentata | "                       | "         | "         | "           | "                            | ovate, large 3-5" long   | slightly tomentose |   |  |
| nigra         | "                       | "         | "         | translucent | "                            | rhombic-ovate  | not angled         | coarsely sinuate-dentate, teeth callus-mucronate finely crenate | truncate to broad cuneate                    |
| candicans*    | "                       | "         | "         | "           | essentially terete, glabrous | ovate-lanceolate   | "                  | serrate coarsely crenate-serrate, ciliate                       | cuneate, without glands cordate, with glands |



The Genus *POPULUS* is recognized thus

WINTER : deciduous trees with the upper bark smooth and colored greenish, or whitish or orange, and the lower bark gray and deeply fissured; twigs moderate or coarse, terete or 5-angled; pith rather small, 5-angled, brownish, almost continuous; leaf scars alternate, on raised cushions, broadly crescent shaped or triangular, inclined to be 3-lobed, with 3 bundle traces and narrow stipule scars;; buds moderate to small, the terminal one enlarged, appressed or curved out, sessile, solitary, with the lowermost scale centered over the leaf scar, usually resinous; terminal bud present; catkin scales laciniate.

# Winter Key

| species       | twigs  | buds  | lateral buds                      | branchlets                            | bark                       |
|---------------|--|---|-----------------------------------|---------------------------------------|----------------------------|
| alba          | white-downy  | white downy   |                                   | white downy when young                | whitish or greenish-gray   |
| simoni        | glabrous, ridged or angled                         | pointed, erect, not white-downy                     |                                   | yellowish, slender, terete, angled    | yellow-gray                |
| grandidentata | gray-tomentose at first, then glabrous, not ridged | puberulous to gray pubescent, ovoid                 | widely divergent                  | red-brown, rather coarse              | upper bark light, greenish |
| tremuloides   | glabrous, not ridged                               | ovoid, pointed, glabrous, lustrous, slightly viscid | more or less appressed, plump     | red-brown, slender                    | greenish                   |
| deltoides     | glabrous, not ridged                               | very long, sticky-resinous, pointed, brownish       | not fragrant                      | usually yellow, crooked and distorted | upper bark orange          |
| candicans*    | terete, glabrous                                   | "   | fragrant                          | red-brown, not so distorted           |                            |
| nigra         | glabrous, terete                                   | elongated, viscid, red-brown, curving out at apex   | not fragrant, curving out at apex | orange to ash-gray                    |                            |

The Genus *Prunus* is recognized thus

**SUMMER** : leaves alternate, serrate, stipulate; flowers solitary, fascicled, or in racemes, floral parts in 5's, perfect, usually white or pink or red, with numerous stamens and one pistil; fruit a one-seeded drupe.

**WINTER** : trees or shrubs having a characteristic bark with long, prominent lenticels, usually almond flavored; twigs slender or moderate, rounded or angled from the nodes, pith continuous; leaf scars alternate, small, half-round or half-elliptical, with 3 minute bundle traces subtended by stipule scars or by the remains of the stipules; buds usually collaterally multiple or occasionally solitary, slender ovoid, sessile, with about 6 exposed scales; end-bud sometimes lacking; leaf scars raised on a cushion.

# Key to Sub-Genera

| group                   | terminal bud       | axillary                    | leaves                                   | flowers and fruit   | fruit   | fruit stone              | buds              |
|-------------------------|--------------------|-----------------------------|--|---|---|--------------------------|-------------------|
| I plums                 | lacking, scar left | solitary                    | rolled in bud                            | few, in umbels, with the leaves from winter-buds                  | glabrous and glaucous, grooved lengthwise           | compressed, not furrowed | longer than broad |
| II apricots             | "                  | "                           | finely serrate, rolled in the bud        | sessile, solitary or in pairs, before leaves, short-stalked       | pubescent, pedicel separating at or before maturity | smooth, margin grooved   | broad             |
| III almonds and peaches | present            | 3, lateral ones flower buds | folded in bud, petiole usually glandular | sessile, rarely stalked, solitary                                 | very pubescent, pedicel separating at maturity      | furrowed and pitted      | round ovoid       |
| IV umbellate cherries   | "                  | "                           | "  | in umbels or solitary, with the leaves from winter buds           | glabrous, small, globular                           | globular, not furrowed   | "                 |
| V racemose cherries     | "                  | "                           | "  | terminal racemes elongated, with the leaves, flowers small, white | glabrous, small, globular, peduncle usually leafy   | "                        | "                 |

Summer and Winter Keys combined

PLUMS

| species             | leaves                       | veins                     | under side of leaves   | fruit                      | buds                   | twigs                       | foliage     | petiole        | termin-<br>al bud |
|---------------------|------------------------------|---------------------------|------------------------|----------------------------|------------------------|-----------------------------|-------------|----------------|-------------------|
| domestica           | broad, net-veined, spreading | numerous, at a wide angle | pubescent              | elliptical, blue-black     | pubescent, light brown | glabrescent                 |             | without glands | lacking           |
| cerasifera          | "                            | "                         | glabrous except midrib | yellow or red, cherry-like | velvety, acute         | glabrous slender, red-brown | green       | "              | "                 |
| cerasifera pissardi | broad-ovate, acuminate       | "                         | "                      | dark wine-red              | glabrous               | darker than above           | dark purple | "              | "                 |

ALMONDS & PEACHES

| species   | fruit                 | habit   | leaves   | bud      | twigs                | stipules  | petioles           | fruit stone            |
|-----------|-----------------------|---------|--|----------|----------------------|---|--------------------|------------------------|
| persica   | pubescent at maturity | tree    | oblong-lanceolate, glabrous, serrate                             | hairy    | red, glabrous        |   | glandular          | deeply pitted          |
| triloba   | "                     | shrubby | broad-ovate, tends to be 3-lobed, deeply serrate, glabrous       | glabrous | glabrous, dark brown | persistent on broken above the base, deeply fringed |                    | with thick, bony shell |
| davidiana | "                     | tree    | ovate-lanceolate, long acuminate, finely sharp-serrate, glabrous | "        | glabrous, red-brown  |   | glands undeveloped | free, small pitted     |

UMBELLATE CHERRIES

| species     | buds           | fruit  | foliage                                 | twigs                             | habit             | buds                    | stipules                                     | bud form                    | leaves   |
|-------------|----------------|--|---|-----------------------------------|-------------------|-------------------------|--|-----------------------------|--|
| tomentosa   | three together | glabrate, red at maturity, almost sessile  | tomentose beneath                       | hairy, very dark brown, tomentose | low, shrubby tree | clustered loosely hairy | persistent or broken above base, bristlelike | loosely scaled, acute       | crowded, rugose dull, obovate, or elliptic, unequally serrate      |
| glandulosa  | "              | subglobose, red, glabrous, pedicels about 2 in. long                               | glabrous beneath or slightly puberulous | glabrous, rarely puberulous       | shrubby           | sessile or stalked      |  |                             | ovate-oblong to oblong-lanceolate, acute, cuneate, crenate-serrate |
| avium       | solitary       | glabrous, red-pedicelled   | not tomentose                           | glabrous                          | tall tree         | on short spurs          |  | ovoid-fusiform glossy brown | oblong-ovate, acuminate, soft, drooping                            |
| cerasus     | "              | "  | "                                       | "                                 | "                 | "                       |  | round, ovoid, dull          | ovate, abruptly short-pointed, stiff, spreading                    |
| subhirtella |                | sepals reflexed involucre persistent, black, sepals erect or spreading, emarginate | dull, hairy, pubescent on veins         | when young                        | tree              |                         |  |                             | oblong-ovate or short acuminate, doubly serrate, teeth short       |

PRUNUS - continued

RACEMOSE CHERRIES

| species       | habit | foliage  | fruit                                   | bud                                       | twigs                   | leaves   | bark                  | flowers  | calyx  |
|---------------|-------|----------|---|---|-------------------------|--|-----------------------|--|--|
| pennsylvanica | tree  | glabrous | sub-umbellate, red, sour                | straw-colored                             | red, shining slender    | oblong-lanceolate finely serrate, often gland-tipped           | red-brown to wine-red | erect at 1st petals same length as stamens                   | deciduous  |
| virginiana    | "     | "        | racemes dark red, astringent pit smooth | dull light brown, scales rough            | red-brown glabrous      | elliptic to obovate, glaucous-cent beneath                     | grayish               | "  | deciduous tube                                   |
| padus         | "     | "        | racemes black astringent pit rugose     | oblong, brown appressed, smooth           | velvety, brown          | oval-oblong, soft, serrate, abruptly acuminate, grayed beneath | "                     | large, spreading or drooping, petals twice length of stamens | glabrous outside deciduous tube pubescent inside |
| serotina      | "     | "        | racemes almost black, astringent        | small, glossy, brown scales rather fleshy | glabrous, glossy, brown | lanceolate to oblong-ovate, hard, glossy, callus-serrate       | brown                 | small in racemes   | persistent                                       |

N.B. Prunus padus is very like P. virginiana but has larger flowers on longer pedicels, in racemes which are looser, often drooping, and somewhat leafy. (from L.H. Bailey)

PYRUS COMMUNIS is recognized thus

SUMMER : leaves alternate, simple, toothed but not lobed, petiolate, stipulate, orbicular-ovate to oblong-ovate, subcordate to broad cuneate, crenate-serrulate, glabrous, with a hard and lustrous surface; flowers fairly large, white with brownish stamens, long-pedicelled, nearly glabrous; fruit pyriform, pome, with grit cells.

WINTER : a broad pyramidal tree, the young branchlets glabrous, occasionally ending in spines; twigs moderate, terete, with numerous spurlike fruiting branchlets, lenticels conspicuous, pith continuous, color yellow-brown, shining; leaf scars alternate, somewhat raised or the nodes swollen beneath them, linear or U-shaped, with three bundle traces and no stipule scars; buds moderate, solitary, sessile, with about 4 mucronate scales more or less keeled above; end-bud sometimes lacking.

PRUNUS - cont'd -- PYRUS

The Genus QUERCUS is recognized in

SUMMER : leaves short-petioled, pinnately veined, simple or lobed, margin toothed or rarely entire; staminate flowers in catkins; fruit an acorn; buds multiple at ends of twigs, with many scales, lateral buds generally smaller and solitary; twigs fluted.

| species         | fruit                 | lobes                | leaves                             | bark  | fruit                    | leaf form                                     | buds                                 | acorn                         | leaf base                 | leaf surface                       |
|-----------------|-----------------------|----------------------|------------------------------------|---|--------------------------|---|--------------------------------------|-------------------------------|---------------------------|------------------------------------|
| marilandica     | matures second season | acute bristle tipped | deep-cut or lobed                  | deeply furrowed, scaly, inner bark not yellow |                          | broadly obovate                               | rusty hairy                          | scales cup                    | rounded                   | brown tomentose beneath            |
| velutina        | "                     | "                    | " thick, leathery                  | cut in nearly square plates, inner yellow     |                          | obovate to oblong                             | hoary tomentose, angular             | scales hoary pubescent        | cuneate to truncate       | pubescent to glabrous beneath      |
| ellipsoidalis   | "                     | "                    | deep-cut or lobed                  | inner bark yellow                             |                          | elliptic                                      | lustrous, glabrous, slightly angular | ellipsoid, solid, brown hairy | truncate to broad cuneate | glabrous beneath, lustrous above   |
| coccinea        | "                     | "                    | deep-cut or lobed thin             | inner bark red                                |                          | elliptic with obovate sinu- ped sinus         | not angular, pubescent               |                               | truncate or broad cuneate | "                                  |
| palustris       | "                     | "                    | "                                  |   |                          | elliptic, sinu- and lobe sides parallel       |                                      | saucer-shaped                 | cuneate                   | "                                  |
| borealis maxima | "                     | "                    | "                                  |   |                          | oblong, broad sinus spreading                 | glabrous except apex                 |                               | cuneate                   | glabrous beneath, dull above       |
| phellos         | "                     | "                    | entire not lobed                   |   | nearly sessile           | linear-oblong to lan- ceolate                 |                                      |                               |                           | glabrate beneath                   |
| imbricaria      | "                     | "                    | " margin thickened                 | firm  | peduncle short           | oblong  |                                      | turbin- ate                   |                           | pubescent beneath                  |
| bicolor         | matures first season  | pointed              | sinuate not lobed                  | thin, scaly, curling                          | petiolate 1/2 in. long   | obovate, margin sinuate                       |                                      |                               |                           | tomentose beneath                  |
| muhlenbergi     | "                     | "                    | not cut or lobed                   | not scaly curling                             | sessile or short stalked | oblong to oblong-lan- ceolate                 |                                      |                               | rounded                   | gray tomentose beneath             |
| prinus          | "                     | "                    | "                                  |   |                          | oblong-obovate, cuneate, acuminate, mucronate |                                      | scales free to base           | cuneate                   | white hairy beneath lustrous above |
| prinoides       | "                     | "                    | teeth obtusish                     | habit shrubby                                 | sessile                  | ovate-oblong to oblong                        |                                      |                               | cuneate                   | gray-hairy beneath                 |
| macrocarpa      | "                     | rounded deep cut     | lower half lobed, upper fan-shaped | corky- ridged                                 |                          | obovate                                       |                                      | fringed                       |                           | tomentose beneath                  |
| alba            | "                     | "                    | sinuses deepcut, rounded           | not corky- ridged                             | peduncles short          | obovate, petioles very short                  |                                      |                               | cuneate                   | glaucous beneath                   |
| robur           | "                     | "                    | "                                  | "   | peduncles longer         |   |                                      |                               | auriculate                | "                                  |



The Genus QUERCUS is recognized in

WINTER : twigs moderate, fluted; pith star-shaped in cross section; leaf scars multiple, rather small, half round, slightly elevated, with 10 or 12 scattered bundle traces and small stipule scars; buds solitary or collaterally multiple, sessile, globose, ovoid, or conical, with numerous 5-ranked scales.

| species         | twigs           | acorn                     | branch     | buds   | acorn cup                      | fruit pedicel                   | bark                                 | bud scales        | nut                | bud apex           | twig color                |
|-----------------|-----------------|---------------------------|------------|--|--------------------------------|---------------------------------|--------------------------------------|-------------------|--------------------|--------------------|---------------------------|
| macrocarpa      | thick tomentose | sweet, matures 1st season | corky      | 1/8" ellipsoid, pale pubescent all over  | fringed at rim                 |                                 |                                      |                   |                    |                    | gray pubescent            |
| bicolor         | glabrous        | "                         | shaggy     | 1/8", only upper 1/2 pubescent, conical, slightly grooved                      | not fringed                    | 1/4" long pubescent short stout | thin, scaly curling light gray flaky |                   |                    |                    |                           |
| prinus          | "               | "                         | not shaggy | "  | "                              | sessile                         | habit shrubby                        | pale margined     | oblong apex pilose | acute or acuminate |                           |
| prinoides       | "               | "                         | "          | ovoid or conical-ovoid, brown, puberulent or glabrous                          | not fringed                    |                                 |                                      | "                 | ovoid              | acute              | red-brown                 |
| muhlenbergi     | "               | "                         | "          | conical, only up per 1/2 pubescent   | "                              | "                               | light gray tree form                 | "                 | apex downy         | acute              |                           |
| alba            | "               | "                         | "          | 1/8", ovoid, red-brown, terete, glabrous                                       | "                              | short                           | "                                    | not pale margined | oblong not hairy   | obtuse             | gray or purplish glabrous |
| robur           | "               | "                         | "          | 1/8", stout, ovoid dark brown, slightly angular, lateral buds widely divergent | "                              | long                            | dark gray furrowed firm              |                   |                    |                    | reddish                   |
| imbri-carla     | glabrous        | bitter matures 2nd season | "          | lateral buds widely divergent  | "                              | brown smoothish                 |                                      | pale margined     |                    |                    | glabrous light brown      |
| palustris       | glabrous        | "                         | "          | 1/8" glabrous lustrous, lateral obtuse, more or less appressed                 | "                              | brown or green smoothish        |                                      |                   | ob-tuse            |                    |                           |
| phellos         | "               | "                         | "          | medium small, brown, glabrous very acute                                       | "                              |                                 |                                      |                   | hemispherical      |                    | red-brown                 |
| borealis maxima | "               | "                         | "          | 1/4", glabrous lustrous  | saucer-shaped very flat narrow |                                 | inner whitish                        |                   | acute              |                    |                           |
| ellipsoidalis   | "               | "                         | "          | 1/4", glabrous, lustrous, pubescent  | top-shape                      |                                 | inner light yellow                   |                   | kernel yellow      |                    |                           |
| marilandica     | puberulent      | "                         | "          | conical-fusiform rusty, hairy  | top-shape                      |                                 | not yellow                           | pubescent         | acute              |                    |                           |
| velutina        | glabrous        | "                         | "          | hoary tomentose, angular, large ovoid  | deep saucer or bowl shape      |                                 | inner yellow                         | tomentose         | ob-tuse            |                    |                           |
| coccinea        | "               | "                         | "          | upper half pubescent, dark red-brown   | broadly top-shape              |                                 | inner red                            |                   | obtusish           |                    |                           |

QUERCUS -- Winter Key



The Genus ROBINIA is recognized thus

SUMMER : leaves pinnately compound, alternate, petiolate, stipulate; leaflets opposite, short stalked, with stipule-like appendages (stipels), elliptic; flowers in racemes, pealike; fruit a pod, 2-valved, flat, linear-oblong, with several seeds.

WINTER : trees or shrubs; twigs zigzag, more or less angular, with two prickles at each node, pith round, brownish, continuous; leaf scars alternate, broadly triangular or 3-lobed, with 3 bundle traces; stipules persistent in the form of paired spines; buds small, superposed, covered by a membrane; end-bud lacking.

#### Summer Key

| species      | flowers        | branchlets                 | fruits      | leaflets  |
|--------------|----------------|----------------------------|-------------|---|
| pseudoacacia | white          | glabrous                   | smooth pods | elliptic or ovate, 7-19   |
| hispidia     | pink to purple | hispid, sometimes glabrous | -----       | glabrous<br>less than 15, glabrous,<br>suborbicular to oval, apex rounded |
| viscosa      | "              | glandular-viscid           | -----       | more than 15, ovate<br>rachis glandular or viscid                         |

#### Winter Key

| species      | habit   | twigs                                     | thorns                           |
|--------------|---------|---|----------------------------------|
| hispidia     | shrubby | very bristly, not viscid<br>nor glandular | -----                            |
| viscosa      | tree    | densely glandular-viscid                  | stipular thorns small or lacking |
| pseudoacacia | tree    | glabrous, not glandular                   | 2 stipular prickles at each node |



The Genus *SALIX* is much involved and exceedingly difficult to identify absolutely. But it is possible to know the species in this chart sufficiently to recognize them readily in summer and fairly well in winter. *SALIX* is usually identified by the buds which have one bud scale opening on the inside next to the twig; and by the very flexible (willow) twigs. Leaves alternate, petiolate or sessile, toothed or entire, stipulate; flowers in aments; fruit a 2-valved capsule, formed in spring.

| species      | habit                  | leaves   | fruit   | number of<br>stamens | petioles                                | twigs                             | flowers   | stipules       | buds   |
|--------------|------------------------|--|---|----------------------|---|-----------------------------------|---|----------------|--|
| babylonica   | decidedly<br>pendulous | lanceolate, finely<br>serrate, glabrous,<br>glaucous beneath   |   |                      | not<br>glandular                        | olive-<br>green,<br>not<br>bloomy |   |                |  |
| alba         | large<br>tree          | lanceolate, serrate,<br>pubescent beneath  |   | two                  | obscurely<br>glandular                  | green or<br>brown                 |   |                |  |
| vitellina    | " "                    | "  |   | "                    | "                                       | bright<br>yellow                  |   |                |  |
| nigra        | "                      | linear-lanceolate,<br>closely serrulate,<br>glabrous, green both<br>sides  |   | 3-5                  | not<br>glandular<br>slender &<br>terete |                                   |   |                |  |
| amygdaloides | "                      | lanceolate, serrate,<br>glabrous beneath   |   | "                    | not<br>glandular<br>slender,<br>terete  |                                   |   |                |  |
| incana       | often<br>shrubby       | long-linear, revo-<br>lute, white tomen-<br>tose beneath   |   |                      | glandless                               | villous,<br>red-<br>brown         | before<br>leaves on<br>winter<br>branches                                 | lacking        |  |
| caprea       | "                      | broad & short, white<br>tomentose beneath  |   |                      | "                                       | red and<br>green                  |   | promi-<br>nent | large, red<br>stout, red<br>large but<br>more silen-<br>der, almost<br>black |
| discolor     | "                      | oblong to obovate,<br>serrate, acuminata,<br>cuneate, glaucous   |   |                      | "                                       | blackish<br>with a<br>red cast    |   |                |  |
| pentandra    | "                      | broad ovate to ob-<br>long-ovate, smooth,<br>glossy, glandular-<br>serrate, fragrant<br>when bruised, acu-<br>minate | lustrous<br>straw color,<br>cordate,<br>base<br>tapering<br>gradually     | more than<br>3       | glandular                               | polished<br>green                 | with or<br>after<br>leaves, on<br>short, on<br>lateral<br>leafy<br>shoots |                |  |
| lucida       | "                      | ovate-lanceolate,<br>pubescent at first,<br>later glossy, broad<br>& smooth, serrate,<br>long-acuminate<br>glabrous  | dull straw-<br>color, base<br>rounded or<br>cuneate,<br>bottle-<br>necked | "                    | "                                       | duller<br>green                   | "<br>larger   |                |  |

# WINTER identification for the Genus SALIX

shrubs or trees; young bark smooth and colorful, green, gray, yellow, or red; twigs very flexible lustrous, slender, terete, with a continuous pith; leaf scars alternate, low, U-shaped, with 3 bundle traces; stipule scars short or wanting; buds mostly small, oblong, appressed, sessile, solitary, with a single scale opening on the inside next the twig.

| species      | habit                                     | twigs                           | twig color                                | lateral buds  | catkins  |
|--------------|---|---------------------------------|---|---|--|
| babylonica   | tree, pendulous                           | slender, whiplike               | yellowish                                 |   |  |
| alba         | erect tree                                | slender, flexible, break easily | greenish                                  | appressed, gibbous                                    |  |
| vitellina    | "   | "                               | bright yellow                             | "   |  |
| nigra        | "   | "                               | bright red-brown, glabrous or pubescent   | "   |  |
| amygdaloides | "   | "                               | dark orange or red-brown, lustrous        | dark brown, gibbous, broad-ovoid, ridged, lustrous    |  |
| incana       | shrubby                                   | slender, dense, very flexible   | quite red                                 | red, appressed, gibbous                               |  |
| caprea       | ascending                                 | more stout, flexible            | green, tinged red                         | very large, ovoid, stout, scale reddish               |  |
| discolor     | spreading                                 | slender, flexible               | brown                                     | large but long and slender, metallic black tinged red |  |
| pentandra    | tree                                      | "                               | brownish-green, lustrous, viscid in youth |   | small, after the leaves large, with the leaves |
| lucida       | shrub or tree not so tall as S. pentandra | "                               | polished green or yellow-brown            |   |  |

## SALIX -- Winter Key

Sassafras varilfolium is recognized thus

SUMMER : leaves alternate, simple or 1-3 lobed, entire, 3-veined at the base, distinctively flavored and mucilaginous; branchlets and buds glabrous green and glaucous; flowers dioecious, pale yellow; fruit an ovoid blue drupe on a fleshy carmine pedicel.

WINTER : trees with orange bark and green twigs, freely suckering; aromatic; twigs moderate, with nodes shortened near the tips; pith slightly angled, continuous; leaf scars small,  $\frac{1}{2}$ -round or crescent shaped, somewhat raised, with a linear bundle trace which may be broken into 3 and without stipule scars; buds solitary, sessile, ovoid, with about 4 fleshy scales; the end-bud enlarged.

SOPHORA JAPONICA is recognized thus

SUMMER : leaves alternate, pinnately compound, with 7-17 leaflets, petiolate, with small stipules; leaflets opposite, small, ovate, acute, glaucous beneath, slightly stalked; flowers yellowish, pealike, in panicles; fruit an indehiscent pod, terete but constricted between the several seeds; young branchlets green.

WINTER : usually trees; twigs moderate, swollen at the nodes with long internodes, zigzag, angled, green and glabrous; pith triangular, greenish; leaf scars alternate, raised, with an articular membrane which when torn leaves the scars U-shaped, with 3 bundle traces and with stipule scars; buds superposed, sessile, indistinctly scaly, woolly, at first concealed by a membrane; the end-bud lacking; odor strong and offensive when cut or bruised.

The Genus SORBUS is recognized thus

SUMMER : leaves alternate, stipulate, pinnately compound or pinnatifid, serrate; flowers small, white, in terminal, compound corymb, white, floral parts in 5's; fruit a small red pome clustered near the tip, 1/2-round, little raised, with 3 bundle traces; leaf scars alternate, buds solitary, sessile; lateral buds mostly suppressed, terminal bud rather large, long-ovoid, with about 4 pointed scales.

#### Summer Key

| species     | leaves             | leaflets   | leaflet tip    | fruit            |
|-------------|--------------------|--|----------------|------------------|
| quercifolia | pinnately cleft    |  |                |                  |
| americana   | pinnately compound |  | long acuminate | orange-red       |
| aucuparia   | "                  | 11-17, lanceolate<br>7-15, oval to<br>ovate-lanceolate | acute          | darker, deep red |

#### Winter Key

| species     | buds              | bundle traces | SORBUS -- Summer Key |
|-------------|-------------------|---------------|----------------------|
| americana   | elongated, gummy  | five          |                      |
| aucuparia   | elongated, woolly | five          |                      |
| quercifolia | elongated, woolly | three         |                      |

SORBUS -- Winter Key

The Genus *TILLIA* is recognized thus

**SUMMER** : leaves alternate, simple, 2-ranked, slender long-petioled, broadly ovate, oblique at the base, serrate; flowers in drooping cymes from the midrib of a long and narrow leaf-like bract, creamy-white and very fragrant, the source of the finest honey; fruit globose, nut-like.

**Summer Key**

| species             | flowers            | leaves  | habit     | veins  | leaf surface | twigs                                | buds                         |
|---------------------|--------------------|---|-----------|--|--------------|--------------------------------------|------------------------------|
| <i>americana</i>    | with staminodes    | essentially glabrous, glossy beneath                      |           |  |              | glabrous, stout greenish, tinged red | glabrous, stout, dark red    |
| <i>heterophylla</i> | "                  | dense tomentose beneath, often brown                      |           |  |              | glabrous, moderate, red              | glabrous, moderate, deep red |
| <i>tomentosa</i>    | "                  | white tomentose beneath                                   | erect     |  |              | tomentulose                          | tomentulose                  |
| <i>petiolaris</i>   | "                  | "   | pendulous |  |              | "                                    | "                            |
| <i>cordata</i>      | without staminodes | glaucous beneath, small                                   |           | with axillary hairs, triple veins not pronounced |              | glabrous, slender                    | glabrous, small              |
| <i>euchlora</i>     | "                  | glabrous with tufts of hair beneath                       |           |  | glossy       | glabrous                             | glabrous                     |
| <i>europaea</i>     | "                  | glabrous, glaucous with tufts of hair beneath medium size |           |  | dull         | glabrous, numerous slender           | glabrous                     |
| <i>platyphyllos</i> | "                  | pubescent beneath   |           |  |              | loosely hairy                        | loosely hairy                |

*Tillia cordata* and *Tillia europaea* have conspicuous axillary tufts of hairs at the base of the blade on the under side.

The Genus *TILIA* is recognized thus

WINTER ; twigs moderate, zigzag, rounded, with rather long internodes; leaf scars alternate, 2-ranked, half-elliptical, a little elevated, with 3 bundle traces which are usually compound, and with unequal stipule scars; buds solitary, sessile, rather largish, lop-sided, ovoid, with 2-3 greenish or red lustrous scales; the end-bud lacking.

# Winter Key

| species      | twigs    | hairiness           | habit    | shell of fruit | fruit          | branchlets           | twig color                | bark                |
|--------------|----------|---------------------|----------|----------------|----------------|----------------------|---------------------------|---------------------|
| platyphyllos | hairy    | loose, sparse       |          |                |                |                      |                           |                     |
| tomentosa    | "        | densely tomentulose | erect    |                | 5-angled       |                      |                           | gray streaked black |
| petiolaris   | "        | "                   | drooping |                | 5-furrowed     |                      |                           |                     |
| cordata      | glabrous | ----                |          | thin, fragile  |                | slender, very twiggy |                           |                     |
| europaea     | "        | ----                |          | thick          |                | slender less twiggy  |                           | almost black        |
| euchlora     | "        | ----                |          | "              | subglobose     | "                    |                           |                     |
| heterophylla | "        | ----                |          | "              | ellipsoidal    | moderate             | blood-red                 |                     |
| americana    | "        | ----                |          | "              | ovoid          | stout                | reddish on the upper side |                     |
|              |          |                     |          |                | oblong-obovoid |                      |                           |                     |

N.B. *Tilia platyphyllos* is included in this key for the sake of distinction but further discussion of it is omitted since it seems less desirable than the others for landscape use. It is occasionally sold as *T. europaea* (*vulgaris*). In its youth it appears very fine, better than *europaea*, dense and shapely. It leafs out early and flourishingly, but in later growth and habit it has many disadvantages such as frost-cracking and sooty deposit plus a serious summer infestation of red spider which quickly yellows the foliage and causes it to drop. For that reason it is better to avoid planting this species.

*T. euchlora* is rapid in growth and hardy, but it appears to suffer in much the same way as *platyphyllos*; so again we include it in the key only for the sake of identification, but omit much data.



# URTICACEAE

1. Fruit a one-seeded samara, winged, in clusters; bark with flattened ridges; leaves usually doubly serrate, with base oblique; winter buds spreading with scales in 2 ranks. . . . . Ulmus
2. Fruit a short-stalked drupe; branches never spiny; bark smoothish, scaly; leaves singly serrate, with base symmetrical, subcordate; winter buds spreading with scales in 4 ranks. . . . . Zelkova
3. Fruit an oblong, berrylike drupe with a sweetish, date-like flavor; bark light gray with deep, corky ridges; winter buds appressed . . . . . Celtis

The Genus *ULMUS* is recognized thus

**SUMMER** : leaves 2-ranked, alternate, simple, thickish, dark green, usually doubly serrate, oblique at the base; twigs slender, zigzag, 2-ranked; leaf scars raised very little, broadly crescent shaped, with 3 bundle traces and unequal stipule scars.

| species             | leaves                            | fruit                       | flowers  | bark of branches          | twigs                       | buds                      | leaf margin    |
|---------------------|-----------------------------------|-----------------------------|--|---------------------------|-----------------------------|---------------------------|----------------|
| <i>racemosa</i>     | essentially smooth both sides     | hairy all over              | in pendulous racemes                               | often corky               | pubescent                   | large, pillose            | doubly serrate |
| <i>glabra</i>       | "                                 | glabrous                    | dense clusters                                     | not corky, smooth         | hispid-pubescent            | large, hairy, 4 scales    | "              |
| <i>carpinifolia</i> | as above & lustrous               | glabrous                    | "  | "                         | glabrous                    | large, minutely pubescent | "              |
| <i>americana</i>    | rough above, soft pubescent below | hairy around edge           | on long slender pedicels, pendulous                | rough                     | glabrous                    | small, glabrous           | "              |
| <i>fulva</i>        | scabrous both sides               | hairy only over seed        | short pedicelled, in dense clusters                | rough, occasionally corky | rough hairy                 | large, rusty tomentose    | "              |
| <i>procera</i>      | rough both sides                  | glabrous                    | short pedicelled, in dense clusters, not pendulous | rough, occasionally corky | glabrescent                 | large, pubescent          | "              |
| <i>pumila</i>       | glabrous, glabrous, glabrous      | glabrous, obliquely obovate | very short stalked                                 | smooth                    | slightly pubescent, slender | tiny, hairy with 4 scales | singly serrate |

The Genus *ULMUS* is recognized thus

WINTER : twigs slender, terete, zigzag; 2-ranked in one plane; pith small, rounded, continuous; buds solitary, 2-ranked, ovoid, obliquely sessile; bud-scales obtuse; leaf scars scarcely raised, broadly crescent-shaped, with 3 bundle traces and unequal stipule scars.

N.B. usually the twig in winter and the leaf in summer are sufficient identification.

# Winter Key

| species              | inner bark       | buds                       | bark structure      | twigs            | branchlets                               | bud size      | bud scales   | roots         |
|----------------------|------------------|----------------------------|---------------------|------------------|--|---------------|--------------|---------------|
| <i>fulva</i>         | mucilaginous     | brown tomentose            | red all through     | scabrous         |  |               |              |               |
| <i>americana</i>     | not mucilaginous | pale pubescent or glabrous | with white layers   | glabrous         |  |               |              |               |
| <i>racemosa</i>      | "                | large, pillose             | uniform all through | corky, pubescent |  |               |              |               |
| <i>carpini-folia</i> | "                | large, more or less hairy  | "                   | not corky        | glabrous                                 |               |              |               |
| <i>pumila</i>        | "                | very small, scales ciliate | "                   | "                | slightly pubescent                       | tiny, oblique | four visible |               |
| <i>glabra</i>        | "                | large, blackish-red        | "                   | "                | hairy while young                        | large         | four visible | not suckering |
| <i>procera</i>       | "                | "                          | "                   | "                | pubescent, occasionally with corky wings | large         | four or more | sucker-ing    |

# KEY TO THE SHRUBS IN WINTER

- A. leaf scars whorled (three at a node) or opposite.
  - Pith small, angular; buds in depressed pockets, indistinctly scaly; stipule scars evident . . . . . Cephalanthus
  - Pith large, roundish; buds not in depressed pockets and with distinct scales; without stipule scars . . . . . Hydrangea
  - Pith brown, excavated . . . . . Deutzia
- AA. Leaf scars opposite (two at a node).
  - Branchlets and twigs densely clothed with silvery or brown scales. . . . . Shepherdia
  - Branchlets and twigs not clothed with scales.
    - Twigs spinescent . . . . . Rhamnus
    - Twigs not spinescent.
      - Branchlets enlarged at the nodes and flattened; buds superposed in a single-budlike aggregate; leaf-scar horseshoe shaped; parts aromatic when bruised . . . . . Calycanthus
      - Nodes not especially enlarged nor flattened.
        - Buds naked or with a single scale or a sac of two closely united scales, short, fat, and gummy within . . . . . Viburnum
        - Buds with several scales.
          - b. Buds stalked.
            - Lateral buds often concealed by a persistent petiole base; buds oblong and stalked; leaf scars connected by a concave line . . . . . Cornus
            - Lateral buds evident though small; leaf scars meeting or almost so, though not connected . . . . . Viburnum
          - bb. buds sessile.
            - c. outer bark freely peeling.
              - Twigs and buds densely rusty-tomentose . . . . Hydrangea
              - Twigs and buds not rusty-tomentose.
                - Young growth orange-colored; buds concealed under a membrane . . . . . Philadelphus
                - Not orange-colored and buds not concealed.
                  - Buds sometimes superposed.
                    - Leaf scars on the tips of raised bases . . . . . Lonicera
                    - Leaf scars not or slightly raised . . . . . Viburnum
                  - Buds not superposed.
                    - Twigs very hairy; buds gray-velvety . . . . . Kolkwitzia
                    - Twigs and buds glabrous or glabrescent.
                      - Pith spongy or excavated . . . . . Deutzia
                      - Pith continuous . . . . . Viburnum
        - cc. outer bark firm
          - d. leaf scars with three bundle traces.
            - e. scars large and broad.
              - Twigs stout, terete; buds solitary; end-bud enlarged . . . . . Aesculus
              - Twigs angled and with a very large, soft pith; scars sometimes with 5-7 bundle traces; buds multiple . . . . . Sambucus
            - ee. scars moderate or small.
              - Leaf scars hairy at the top . . . . . Rhodotypos
              - Leaf scars not hairy at the top.
                - Twigs with 2-4 hairy, raised lines . . . . . Weigela
                - Twigs without hairy, raised lines.
                  - f. Twigs green.
                    - Twigs bright green; buds silvery silky-hairy . . . . . Laburnum
                    - Twigs olive-green, lustrous; buds glabrous, with few scales; end-bud lacking; fruit an inflated bladderlike pod . . . . . Staphylea
                  - ff. Twigs not green.
                    - Twigs relatively coarse, with a large pith . . . . . Hydrangea

- Twigs and pith moderate.
  - Leaf scars frequently alternate, half-elliptical or crescent-shaped . . . . Rhamnus
  - Leaf scars always opposite.
  - Buds more or less appressed . . . . Viburnum
  - Buds not appressed.
    - Leaf scars on the narrowed ends of raised bases; buds at a very broad angle with the twig . . . . . Lonicera
    - Leaf scars only slightly raised; angle of bud acute . . . . . Deutzia
- dd. Leaf scars with only one bundle trace, or with many traces scattered or in an ellipse or nearly confluent in a line (includes cases where the traces are indistinguishable in a shrivelled scar)
  - g. soft, pithy half-shrubs with superposed buds.
    - Scars triangular or crescent-shaped . . . . Buddleia
    - Scars and bundle-traces C-shaped . . . . . Callicarpa
  - gg. not as above.
    - h. Pith finally chambered or excavated.
      - Twigs distinctly ridged or winged . . . . Euonymus
      - Twigs not distinctly ridged or winged.
      - Buds slender, moderate, finally multiple; twigs yellow-buff . . . . . Forsythia
      - Buds small.
        - Leaf scars small, ragged, raised, and shrivelled . . . . . Symphoricarpus
        - Leaf scars moderate, distinct, low and diamond-shaped; twigs angled below the nodes . . . . . Hypericum
    - hh. Pith continuous and persistent.
      - Twigs angular or grooved below the nodes.
        - i. leaf scars relatively broad.
          - Buds superposed, scales stiff-pointed.
            - Chionanthus
            - Buds not superposed, scales not stiff-pointed . . . . . Syringa
        - ii. Leaf scars small or minute, elevated.
          - scars shrivelled . . . . . Symphoricarpus
      - Twigs terete; scars small, elevated, distinctly outlined and without stipule scars . Ligustrum
- AAA. Leaf scars alternate (one at a node)
  - j. stems with twig spines.
    - k. densely clothed with silvery or brown scales.
      - End-bud often present, twigs moderate; buds with about four exposed scales; thorns lateral . . . . . Elaeagnus
      - End-bud lacking; twigs slender, ending in spines; buds with two exposed scales . . . . . Hippophae
    - kk. Not clothed with scales.
      - Twigs puberulent, green or brownish; buds solitary . . . Ceanothus
      - Twigs glabrous; buds small.
        - Twigs whitish or short striate, 5-angled; buds inconspicuously multiple; habit scrambling . . . . . Lycium
        - Twigs orange or reddish, rigid; buds becoming conspicuously multiple; twig spines axillary . . . . . Cydonia
  - jj. stems with prickles (superficial outgrowths)
    - l. Prickles below the nodes or scars.
      - m. Twigs grooved or furrowed.
        - With branched or slender leaf-spines and fascioled leaves or scars . . . . . Berberis
        - Buds developing a green grooved spine and stipules . . Genista
      - mm. Twigs not grooved or furrowed.
        - n. Twigs with 1-3 prickles below each narrow leaf scar.
          - Twigs light-colored, moderate; bundle-traces 5; buds sessile with about 3 exposed scales . . . . Acanthopanax
          - Twigs darker; bundle traces 3; buds with several loose scales . . . . . Ribes

- nn. Twigs with numerous stout, curved thorns below the nodes;  
twigs very coarse . . . . . *Aralia*
- ll. Prickles scattered (not all at the nodes).  
Young twigs angular or ridged, and with paired stipular  
thorns . . . . . *Robinia*
- Twigs terete; prickles slender or recurved . . . . . *Rosa*
- lll. Prickles beside the bud (stipules)  
Twigs and buds pungently aromatic; buds rusty-red . . . *Zanthoxylum*  
Not pungently aromatic (or at least only the stipules so).  
Paired prickles becoming coarse and strong; twigs strongly  
ridged near the tip and colored orange and green; buds  
superposed beneath a membrane . . . . . *Robinia*
- Paired prickles small, remaining weaker.  
Twigs green, with 3 decurrent ridges beneath the leaf-scars  
Caragana
- Twigs not green nor with decurrent ridges; leaf scars torn  
and shrivelled on much raised petiole bases; leaf bases  
not overlapping . . . . . *Rubus*
- jjj. Without prickles or spines (unarmed).  
Densely clothed with silvery or brown scales; buds with 4 exposed  
scales . . . . . *Elaeagnus*
- Not as above.
- Twigs terete, fluted near the tip and terminating in a dilated  
flattened tip with several bud and fruit scars . . . . *Hibiscus*
- Twigs not fluted near the tip nor terminating in fruit scars.
- k'. Buds naked.  
Fruit a 2-celled woody capsule . . . . . *Hamamelis*  
Fruit a small drupe . . . . . *Rhamnus*
- kk'. Buds not naked.  
Stems brownish-yellow overcast with a leaden color near  
the tips; buds a little elongated, pointed, and loose.  
Clethra
- Stems not as above.
- o. Stems and buds spicily and pungently aromatic.  
Buds rather small, superposed, the upper flower-  
buds collaterally doubled and stalked . . . . *Benzoin*  
Buds not superposed nor multiple.
- p. Young twigs resinous-dotted.  
With stipule scars . . . . . *Comptonia*  
(see *Myrica* key)
- Without stipule scars . . . . . *Myrica*
- pp. Young twigs not resinous-dotted; coarse  
or else hairy or glaucous . . . . . *Rhus*
- oo. Not aromatic.
- q. Twigs, stems, and branches green.  
With a narrow scar completely encircling the  
twig at each node . . . . . *Magnolia*  
Without such scar.
- r. stems definitely and positively ridged.  
Buds small, encased in hardened greenish  
resin; ridges about eight . . . . . *Baccharis*  
Buds not resinous; branches smooth.  
Scars with 3 bundle traces; pith rela-  
tively large . . . . . *Kerria*  
Scars with one indistinct bundle trace;  
pith small.  
Some buds producing a green,  
grooved spine . . . . . *Genista*  
Buds not becoming spines . . . . *Cytisus*
- rr. Stems not positively ridged.  
Buds with a single scale opening on the  
inside next the twig . . . . . *Salix*  
Buds with more than one scale, more or  
less stalked . . . . . *Cornus*
- qq. Twigs and stems not green
- s. bark freely peeling.  
Twigs roughened by lenticels and longitudinal  
fissures; bundle traces 3; inner bark  
reddish . . . . . *Exochorda*



- Twigs not roughened as above.  
 Bundle traces 5; inner bark bright orange. *Physocarpus*
- Bundle traces 3; buds stalked; leaf scars narrow;  
 pith spongy . . . . . *Ribes*
- ss. Not freely peeling.  
 Twigs enlarged upwards through the season's  
 growth; leaf scars scalloped and almost  
 encircling the bud . . . . . *Dirca*
- Twigs not enlarged upwards.  
 t. Buds red, elongated; twigs grayish.  
 Bud scales more or less twisted . . . *Amelanchier*  
 Bud scales not twisted . . . . . *Aronia*
- tt. Buds not red.  
 Bud scales keeled and mucronate . . . *Photinia*  
 (sometimes tinged red)  
 Bud scales not keeled nor mucronate.  
 Leaf scars essentially lacking; buds  
 multiple; twigs fine and very dark. *Tamarix*
- Ordinary leaf scars present.  
 u. Bundle traces one.  
 Buds superposed.  
 Leaf scars much raised, with one  
 or 3 bundle traces and with per-  
 sistent stipules; fruit an  
 inflated pod . . . . . *Colutea*
- Leaf scars more or less raised,  
 with 1 bundle trace and with  
 minute stipule scars; fruit  
 a persistent, berrylike drupe. *Ilex*
- Buds solitary or occasionally  
 collaterally multiple.  
 v. Bud scales two.  
 Scales ciliate; no stipule  
 scars . . . . . *Nemopanthus*
- Not ciliate, usually parted  
 and exposing the hairy  
 interior; stipule rather  
 persistent, leaving narrow  
 indistinct scars . . . *Cotoneaster*
- vv. Bud scales more than two.  
 Buds globose to spindle-shaped  
 (thickest at the middle) and  
 with about 6 exposed scales. *Spiraea*
- Buds ovoid and with fewer scales.  
 End-bud present, root deep red;  
 bud scales indistinct,  
 glabrate, stipular; stipule  
 scars small . . . . . *Ceanothus*
- End-bud lacking or deciduous.  
 Seeds solitary in each fruit-  
 cell; young branches with  
 resinous dots . . . *Gaylussacia*
- Seeds several in each cell;  
 young branches not resinous. *Vaccinium*
- uu. Bundle traces 3 or more.  
 Buds at first under a membrane, closely  
 superposed in pairs, silky-hairy;  
 scar finally U-shaped . . . . . *Ptelea*
- Buds never concealed by a membrane.  
 Twigs more or less 3-sided; buds  
 rather large, usually stalked, and  
 with 3 sub-valvate scales . . . *Alnus*
- Twigs and buds not as above.  
 w. Buds superposed.

Stipule scars relatively large;  
pith pale or light brown.

Stephenandra.

Stipule scars small; pith white.

Amorpha

ww. Buds solitary or collaterally  
multiple.

Leaf scars relatively large; buds  
with about 4 exposed scales.

Sorbaria

Leaf scars relatively small; buds  
with fewer or more scales.

x. Leaf scars 2-ranked.

Twigs slender; buds with  
2-3 exposed scales . .

Betula

Twigs moderate; buds with  
4-6 exposed scales . .

Corylus

xx. Leaf scars not 2-ranked.

Buds clustered near the tip  
and with numerous 5-ranked  
scales; bundle traces

numerous . . . . . Quercus

Buds not a above.

Bundle traces 3, minute

Prunus

Bundle traces 3, large

Xanthoceras



## KEY TO THE DECIDUOUS SHRUBS WHEN IN FOLIAGE

- A. Leaves opposite or whorled
  - Branches and under side of leaves densely clothed with silvery or brown scales . . . . . *Shepherdia*
  - Not clothed with silvery or brown scales
  - B. Leaves compound
    - Leaves palmate
      - with 3 leaflets; flowers yellow, in drooping racemes; twigs green . . . . . *Laburnum*
      - with 5-7 leaflets; flowers in large, erect clusters; fruit a 3-valved pod . . . . . *Aesculus*
    - Leaves pinnate
      - with 3 leaflets
        - leaves all compound; flowers in racemes after the leaves . . . . . *Staphylea*
        - leaves chiefly simple; flowers yellow, not in racemes, before or with the leaves . . . . . *Forsythia*
      - with 5-9 leaflets; pith large . . . . . *Sambucus*
  - BB. Leaves simple
    - C. Leaf margin entire, neither toothed nor lobed
      - leaves more or less punctate with pellucid dots; flowers bright yellow in summer; floral parts in 5's; fruit a dry, dehiscent capsule . . . . . *Hypericum*
      - leaves not punctate; flowers not yellow; fruit not dehiscent.
        - twigs ending in a short spine between the upper-most buds . . . . . *Rhamnus*
        - twigs not spinescent
      - D. Petioles short
        - Nodes of stem flattened, parts aromatic when bruised . . . . . *Calycanthus*
        - Nodes not flattened, parts not aromatic
          - Leaves glabrous, glaucous below, often lobed on vigorous shoots; flowers small, pinkish bells . . . . . *Symphoricarpus*
          - not as above; leaves more or less hairy or glabrous, not glaucous nor lobed
            - Leaves firm and lustrous; branches greenish; fruit a drupe in panicles . . . . . *Ligustrum*
            - Leaves soft and dull, bluish or hairy; branches brown; fruit a berry in axillary pairs . . . . . *Lonicera*
      - DD. Petioles medium or long
        - leaves with stipules, often 3 at a node; flowers and fruits in dense globular heads . . . . . *Cephalanthus*
        - Without stipules; flowers and fruits not in globular heads
          - Twigs squarish, especially at the nodes, gray; buds with stiff, keeled scales . . . . . *Chionanthus*
          - Twigs terete
            - Twigs slender and bright-colored; buds small or slender; terminal bud present; leaves with anastomosing veins, more or less pubescent . . . . . *Cornus*
            - Twigs less slender, tan-colored; end-buds usually lacking; leaves glabrous or glaucous or whitened beneath or finely dotted; flowers tubular in terminal pyramidal panicles . . . . . *Syringa*
    - CC. Leaf margin toothed or lobed
      - Twigs with 2-4 hairy, raised lines; fruit a 2-valved capsule . . . . . *Weigela*

Twigs not as above  
 Twigs yellowish or greenish, ridged, pithy, glabrous; leaves lanceolate to ovate, slightly fleshy . . . . . Forsythia  
 Twigs not as above  
 e. leaves distinctly lobed

# ERRATUM

Page 46. Insert between lines 11 and 12: "The leaves not lobed."

Twigs densely brown tomentose near the tip . . . Hydrangea  
 Twigs not brown tomentose  
 Fruit a winged samara; leaves regularly palmately lobed; buds with several overlapping scales . . . Acer  
 Fruit a drupe; buds naked or with two scales which meet but do not overlap . . . . . Viburnum  
 leaves very short-stalked; flowers and fruits in axillary cymes . . . . . Callicarpa  
 Leaf petioles short or moderate; flowers and fruits not in axillary cymes  
 f. twigs green, angled or ridged  
 Soft, pithy, half shrubs; flowers lavender in terminal clusters . . . . . Buddleia  
 Not as above; flowers in stalked, axillary clusters . . . . . Euonymus  
 ff. Twigs not green  
 Twigs ridged or winged . . . . . Euonymus  
 Twigs not ridged or winged  
 Twigs very hairy, gray . . . . . Kolkwitzia  
 Twigs not so hairy, brown  
 Leaf scars ciliate; flowers solitary; fruit a black drupe in terminal clusters of four  
 Rhodotypos  
 Not as above

g. all flowers fertile  
 Branchlets hollow; bark dark brown; peeling; flower clusters axillary; flowers with 5 petals; fruit indehiscent . . . . . Deutzia  
 With solid white pith; bark orange to orange-brown  
 Flowers and fruit sub-paniculate, terminal; flowers with 4 petals; fruit dehiscent in 4 valves; leaves 3-5 nerved at the base, remotely toothed; veins impressed . . . Philadelphus  
 Flowers of 2 kinds - fertile and sterile; leaves serrate  
 Leaves serrate; fruit a capsule; flowers & fruits in terminal corymbs . . . . . Hydrangea  
 Leaves dentate; fruit a drupe; flowers and fruits in cymes . . . . . Viburnum

AA. Leaves alternate  
 Leaves minute and scale-like . . . . . Tamarix  
 Leaves not minute nor scale-like  
 h. Leaves compound  
 Leaves palmate  
 Leaves 5-parted, armed . . . . . Acanthopanax  
 Leaves 3-parted, not armed . . . . . Ptelea  
 Leaves pinnate  
 i. Plant aromatic when bruised  
 without spines or prickles . . . . . Rhus  
 with spines or prickles  
 young leaves glandular, sweetly fragrant and stipulate; prickles strong, hooked, mixed with bristles . . . . . Rosa  
 All parts pungently aromatic; leaves pellucid-dotted; estipulate; prickles in pairs at the nodes . . . . . Zanthoxylum



- ii. Not pungently aromatic
  - j. with thorns or prickles
    - branchlets very coarse and with a large pith, armed with very broad, stout prickles; leaves doubly compound, estipulate, prickly on the upper side  
Aralia
    - branchlets moderate; pith moderate or small; leaves singly compound and with stipules  
Leaves without a terminal leaflet; leaflets obtuse at the tip; stipules often persisting as slender prickles . . . . . Caragana
    - Leaves with a terminal leaflet, acute at the tip  
Prickles stipular, paired at the nodes . . . Robinia
    - Prickles numerous, not limited to the nodes.  
Twigs angular, short-lived; leaves toothed and petioled; pistils borne on a convex receptacle . . . . . Rubus
    - Twigs terete, normal; leaves with dilated stipule-bearing petioles; pistils enclosed in an urn-shaped receptacle . . Rosa
  - jj. without thorns or prickles, leaflets more than three
    - Margin toothed  
Flowers small in panicles; fruit a follicle . . Sorbaria
    - Flowers moderate in racemes; petals clawed; fruit a 3-valved capsule with thick walls . Xanthoceras
    - Margin entire  
Bark fibrous or flaky; flowers in axillary racemes; fruits inflated, with papery walls; leaves not glandular . . . . . Colutea
    - Bark not fibrous nor flaky; flowers in terminal spikes; fruits tiny, glandular, bean-like pods; leaves punctured with glands . . . Amorpha
- hh. leaves simple
  - k. leaves lobed
    - l. petioles with stipules  
Leaves and buds 2-ranked; twigs slender, zigzag; flowers small, white . . . . . Stephanandra
    - Not 2-ranked; twigs coarse, bark peeling; flowers large, pink . . . . . Rubus
  - ll. Petioles without stipules  
Bark freely peeling; leaf 3-lobed . . . Physocarpus
  - Bark firm  
Twigs terminated with numerous, flat, round flower and fruit scars; habit erect; leaves wedge-shaped at base, lobing poorly defined, only the upper half toothed . . . . . Hibiscus
  - Twigs not so terminated with scars; habit arching or tangled  
Leaves slightly 3-5 lobed, dark green above, pale beneath, not glandular . . . . . Spirea
  - Leaves distinctly palmately lobed, bright green both sides, glandular beneath . . . . . Ribes
- kk. Leaves toothed but not lobed
  - m. Having thorns or prickles  
Leaves clustered on short spurs . . . . . Berberis
  - Leaves not clustered on spurs  
Thorns terminal . . . . . Rhamnus
  - Thorns lateral; leaves with large stipules, thick and glossy . . . . . Cydonia
  - mm. Without thorns or prickles.
    - n. Flowers and fruits in catkins .  
Bark in papery layers with long transverse lenticels; fruit a minute nut with membranous wings . . . . . Betula
    - Bark not as above

- buds covered by a single scale, twigs very flexible . . . . . Salix
- buds with more than one scale, twigs less flexible. Fruit a nut enclosed by a leafy involucre . . . . . Corylus
- Fruit not in an involucre, but forming cones . . . . . Alnus
- nn. flowers and fruits not in catkins.
  - o. Plant aromatic when bruised.
    - Leaves very narrow and long, - pinnatifid, fernlike (See species for Myrica) . . . . . Comptonia
    - Leaves short, toothed near the tip or entire, fruits covered with a whitish resin . . . . . Myrica
  - oo. Plant not especially aromatic.
    - p. twigs green, angular.
      - Leaves narrow-ovate, thin, sharply toothed, flowers yellow . . . . . Kerria
      - Leaves obovate, somewhat thick, palmate or 3-nerved; fruit with a conspicuous white pappus . . . . . Baccharis
    - pp. Twigs not typically green (or at least tinged red).
      - Leaves with resinous dots beneath . . . . . Gaylussacia
      - Leaves not resinous-dotted .
        - Leaves typically with 3 main veins; root-stalk red, very large . . . . . Ceanothus
        - Leaves with only one main vein; root-stalk not red .
          - Petioles of leaves usually glandular . . . . . Prunus
          - Not glandular
            - Leaves mucronate at the tip; margin obscurely serrate; fruit on long pedicels. . . . . Nemopanthus
  - Not as above
    - Leaves glaucous, toothed near tip; fruit 5-lobed; bark reddish . . . . . Exochorda
  - Not as above
    - Fruit an acorn; leaves oblong, without stipules, obscurely toothed, gray-tomentulose beneath . . . . . Quercus
  - Not as above
    - q. Fruit a berry, drupe, or pome
      - r. Flowers in racemes
        - Racemes drooping, axillary; leaves oval to obovate . . . . . Amelanchier
      - rr. flowers not in racemes
        - Flowers solitary in the leaf axils; fruit a drupe; leaves singly serrate, with slightly impressed veins, pith green . . . . . Ilex
      - Flowers not solitary, in short corymbs or cymes.
        - Fruit hollow & open at top; a tall shrub or small tree . . . . . Photinia
        - Fruit closed & pointed at top.
          - Leaves with small black glands along the midrib . . . . . Aronia
          - Without such glands . . . . . Rhamnus
  - qq. Fruit a capsule or follicle.
    - Flowers in umbel-like racemes, corymbs or panicles, glabrous or pubescent; fruit of five follicles . . . . . Spirea
    - Flowers in terminal, slender, erect racemes or spikes, pubescence stellate, capsule splitting into 3 valves . . . . . Clethra

kkk. leaf margin entire

s. leaves and twigs clothed with silvery or brown scales.

Twigs with terminal thorns; leaves very slender;

fruit bright orange; twigs with brown

scales near the tip . . . . . Hippophae

Twigs with lateral spines or none; leaves less

slender; fruit dry, yellow to pink; twigs with

brown scales . . . . . Elaeagnus

ss. not clothed with silvery or brown scales

t. having thorns or prickles

Leaves in fascicles on short axillary spurs; hab-

it shrubby; leaves rather small, oval and

short-petioled . . . . . Berberis

Leaves often fascicled, slender, but not on spurs,

and with long stipules; twigs yellowish; habit

scrambling; leaves moderately small, lanceolate,

cuneate, subsessile . . . . . Lycium

tt. without thorns or prickles

Twigs enlarged upwards through the season's

growth; leaf petioles enclosing and conceal-

ing the bud . . . . . Dirca

Twigs not thus enlarged; buds evident.

u. parts aromatic when bruised

Leaves large, oblong, bright green; twigs

lustrous . . . . . Benzoin

Leaves moderate, oval, glaucous; twigs glaucous

Cotinus (see Rhus)

uu. not especially aromatic

Leaves rather large, lop-sided, and with

a sinuate margin . . . . . Hamamelis

Leaves symmetrical

v. buds enclosed by a single scale

Buds large, bearing a petiole-scar

above the base; twigs encircled

by a narrow scar at the nodes . . Magnolia

Buds small or moderate, appressed;

petiole scar below the base of

the bud; twigs very flexible, not

encircled by a scar at the nodes . Salix

vv. buds with several scales

w. branchlets green, striped; leaves

small, often ternate

Branches spineless; seeds with a callous

appendage . . . . . Cytisus

Branches often spiny; seeds with-

out callous appendage . . Genista

ww. Branchlets not green or at least tinged red

Leaves with awl-shaped stipules, ovate

to oval, lustrous dark green . . Cotoneaster

Leaves without such stipules.

Leaves resinous-dotted; fruit berry-

like, with ten 1-seeded nutlets

Gaylussacia

Leaves not resinous-dotted.

Fruit a many-seeded berry . Vaccinium

Fruit a leathery or fleshy

1-seeded drupe; flowers before

the leaves on old wood . . Daphne

# ACANTHOPANAX SIEBOLDIANUS

SUMMER : a shrub, sparingly branched and prickly;

leaves alternate, partly fascicled on short spurs, oblong-obovate, estipulate, palmately divided with 5-7 leaflets, the latter obovate to fruit a 2-5 seeded black berry, seldom seen under cultivation.

WINTER : branches moderate, yellowish, somewhat lenticular, armed with 1-3 prickles beneath each leaf scar, often with short spurs or spur-like branchlets; leaf scars alternate, narrow, crescent- or U-shaped, slightly raised, with 5 small bundle traces and no stipule scars; buds alternate, solitary, sessile, conical-ovoid, with about 3 thin scales evident.

The Genus AMORPHA may be distinguished thus

SUMMER : leaves alternate, pinnately compound, marked with minute dots; leaflets small, entire, with soon falling, awl-shaped stipules; flowers purple or blue, pealike, in terminal spikes, erect, on the back.

WINTER : shrub with slender, yellow-gray twigs, very slightly angled; pith white, continuous; leaf scars alternate, slightly curved, low, triangular, with 3 bundle traces and with small stipule scars from the outer corners; buds small, superposed, nearly globose, projecting at a narrow angle from the twig, with 2-3 exposed scales.

## Summer Key

| species   | habit      | leaflets                                      | pubescence      | calyx                               | flowers | fruit  |
|-----------|------------|---|-----------------|-------------------------------------|---------|--------|
| fruticosa | tall shrub | lowest pair $\frac{1}{2}$ " or more from stem | sparse          | lower lobes acute                   | purple  | curved |
| canescens | low shrub  | lowest pair close to stem                     | dense & whitish | lobes $\frac{1}{2}$ as long as tube | blue    | ---    |

## Winter Key

| species   | buds       | twigs        | stipule scars | leaflets            | color      |
|-----------|------------|--------------|---------------|---------------------|------------|
| fruticosa | superposed | glabrate     | evident       | moderate, scattered | blue-green |
| canescens | solitary   | white-woolly | minute        | small, crowded      | lead-gray  |

ARALIA SPINOSA is recognized thus

SUMMER : branchlets very thick with stout cortical prickles; leaves alternate, very large, petiolate, pinnately to thrice pinnately compound, estipulate; leaflets distinctly stalked, with the veins curving before reaching the margin; base of the petiole clasping the stem to  $\frac{1}{2}$  or more; flowers small, whitish, in large pubescent panicles; fruit small, black, a drupe with 2-5 flattened stones, less persistent than the red-violet pedicels.

WINTER : large shrub or small tree, much suckering, with numerous strong prickles; twigs thick, terete, with a large pith, glabrous; leaf scars alternate, U-shaped, low,  $\frac{1}{2}$ -encircling the twig, with 5 bundle traces and no stipule scars; buds ovoid-conical, solitary, sessile, with few scales, comparatively small.

ACANTHOPANAX

-- AMORPHA

-- ARALIA

The Genus ARONIA may be distinguished thus

**SUMMER** : leaves elliptic or oblong to obovate, with minute black dots or glands along the midrib on the upper side; flowers white or marked pink, in small corymbs, with reddish anthers; fruit a small pome with persistent calyx lobes.

**WINTER** : twigs brown, glabrous, or pubescent, moderate, terete; leaf scars alternate, low, U-shaped, with 3 bundle traces and no stipule scars; buds solitary, sessile, appressed, usually red and elongated-oblong, with about 5 pointed and somewhat glandular-denticulate scales.

#### Summer Key

| species     | under side of leaves  | branchlets | fruit |
|-------------|-----------------------|------------|-------|
| arbutifolia | pubescent             | tomentose  | red   |
| melanocarpa | glabrous or nearly so | glabrous   | black |

#### Winter Key

| species     | twigs and buds        | under side of leaves | fruits |
|-------------|-----------------------|----------------------|--------|
| arbutifolia | hairy                 | rather woolly        | red    |
| melanocarpa | glabrous or nearly so | glabrous             | black  |

#### BACCHARIS HALIMIFOLIA is recognized thus

**Summer** : an unarmed shrub; leaves alternate, moderate sized, simple, toothed but not lobed, petiolate, obovate, thickish, with 3 main veins from the base, cuneate, resinous; flowers and fruits in small heads, these in terminal panicles or corymbs; fruit an achene, ribbed and somewhat compressed, with a white pappus of long, bristly hairs.

**WINTER** : twigs green, angular or ridged, with a small, continuous pith, resinous but not aromatic; leaf scars alternate, small, broadly v-shaped, slightly raised, decurrent in ridges from the angles, with 3 bundle traces and no stipule scars; buds small, oval or globose, with about 4 scales, encased in a hardened, greenish resin.

#### BENZOIN AESTIVALE is recognized thus

**SUMMER** : shrub with all parts aromatic; leaves alternate, simple, entire, oblong-obovate, with one main vein, acute, cuneate, glabrous, short-petioled; buds evident, with 2-3 outer, pale-toned scales; flowers pale honey-yellow, fragrant, in subsessile, axillary clusters; fruit an oblong-obovate scarlet drupe.

**WINTER** : spicily-aromatic when bruised or broken; twigs lustrous olive-green to brownish-green with pale lenticels; leaf scars alternate, small, crescent shaped or half-round, slightly raised, with 3 bundle traces, often confluent, and no stipule scars; buds smallish, superposed, the upper flower buds collaterally doubled and stalked, the leaf buds with about three exposed scales; end-bud lacking.

ARONIA -- BACCHARIS -- BENZOIN

87945



The Genus *BERBERIS* is recognized in

**SUMMER** : leaves alternate, often fascicled on short axillary spurs, simple, often entire; inner bark and wood yellow; flowers yellow, axillary; fruit a several-seeded berry.

**WINTER** : shrubs with spines at the base of very short spurs; wood and inner bark yellow; twigs grooved or furrowed, slender; leaf scars half-round, with 3 minute, often indistinct bundle traces and no stipule scars.

| species                                   | habit         | flowers and branches            | leaves  | branchlets       | spines   |
|---|---------------|---------------------------------|---|------------------|----------|
| <i>buxifolia</i>                          | sub-evergreen | solitary                        | entire  |                  | present  |
| <i>darwini</i>                            | "             | racemes longer than leaves      | dentate, green                                  |                  | "        |
| <i>Mahoberberis neuberti</i>              | "             | unarmed, glabrous               | not fascicled, often pinnately 3-foliolate      | glabrous         | unarmed  |
| <i>Mahoberberis latifolia mentorensis</i> | "             | racemes shorter than leaves     | dentate, glaucous, blue-green                   | pubescent, spiny | unarmed  |
| <i>vulgaris</i>                           | "             | glabrous fascicled              | not fascicled, thicker than <i>B. thunbergi</i> | glabrous         | branched |
| <i>wilsonae</i>                           | deciduous     | racemes                         |   |                  | 3-parted |
| <i>thunbergi</i>                          | "             | fascicles, 2-6, short-stalked   |   | puberulous       | "        |
|   | "             | fascicles, 2-6, slender stalked | red-green (varieties red)                       | glabrous         | simple   |

N.B. *B. sargentiana* and *B. julianae* have glabrous branchlets and are evergreen.

*BUDDLEIA DAVIDI* may be recognized thus

**SUMMER** : semi-woody shrubs; leaves opposite, simple, short-petioled, serrate, glabrous above and white tomentose beneath; flowers violet or red-violet, tubular, with the stamens inserted above the middle of the tube, in long, slender panicles; fruit an oblong, pointed capsule.

**WINTER** : unarmed shrubs; twigs semi-woody, pithy; glabrous or puberulous, square, green to yellowish or straw-colored; leaf scars opposite, small, low, triangular or crescent-shaped, with one bundle trace and with stipule scars transversely connected; buds oblong, sessile, sometimes superposed, with two outer scales.

**CALLICARPA AMERICANA** is recognized thus

**SUMMER** : leaves opposite, pubescent above, tomentose beneath, elliptic-ovate, acuminate, cuneate, crenate-serrate, with fairly long petioles; inflorescence subsessile; flowers small, in axillary cymes; fruit a small, violet drupe, subglobose, with 2-4 stones.

**WINTER** : a soft-wooded shrub; twigs dingy yellowish, round or slightly 4-angled, persistently scurfy with stellate hairs, slender, and with a comparatively large pith; leaf scars opposite or almost so, in 4 ranks, broadly crescent shaped, with one bundle trace and no stipule scars; buds small, often stalked, subglobose, superposed, bud-scales indistinct or almost valvate.

**CALYCANTHUS FLORIDUS** is recognized thus

**SUMMER** : aromatic shrubs; leaves opposite, short-petioled, entire, stipulate, ovate to elliptic, pinnately veined, densely pubescent beneath; flowers brownish-red or deep maroon red with numerous stamens and many narrow petals; fruit an indehiscent capsule, pear-shaped, rather large.

**WINTER** : shrub, sparingly branched; twigs moderate, villous, flattened at the nodes; leaf scars 2-ranked, opposite, the pairs often separated, horseshoe-shaped, much raised, with 3 bundle traces and no stipule scars; buds superposed, in a single bud-like aggregate, sessile, sometimes almost suppressed or hidden, brown-hairy, naked or appearing so; end-bud lacking.

**CARAGANA ARBORESCENS** is recognized thus

**SUMMER** : an unarmed shrub without particular odor; leaves alternate, pinnately compound, without terminal leaflets; leaflets obtuse, soft hairy; stipules often persisting as slender, soft prickles; flowers fascicled, yellow, pea-like; fruit small, beanlike.

**WINTER** : branchlets moderate, stiff, greenish, with 3 decurrent ridges below each leaf scar; leaf scars alternate, much raised, very small,  $\frac{1}{2}$ -round, with the rachis often persisting as a spine, having one bundle trace and stipules persistent, often pungent; buds small to moderate, solitary, sessile, with 3-4 exposed scales.

**COLUTEA ARBORESCENS** is recognized thus

**SUMMER** : branches unarmed, bark fibrous; leaves alternate, pinnately compound, odorless; leaflets small, entire, more than three, with small stipules; flowers yellow in axillary, long-peduncled, few-flowered racemes, pea-like, with the wings about as long as the keel; fruit a glabrescent, inflated pod, indehiscent, with papery walls.

**WINTER** : twigs moderate, grayish, terete but with decurrent lines from the nodes, appressed pubescent; leaf scars alternate, broadly crescent-shaped, much raised, with 1-3 bundle traces and with the stipules persistent on the sides of the leaf cushion; buds small, globose-ovoid, with 2-4 outer scales, superposed.

**CALLICARPA** -- **CALYCANTHUS** -- **CARAGANA** -- **COLUTEA**

**CEPHALANTHUS OCCIDENTALIS** is recognized thus

**SUMMER** : leaves opposite or whorled, simple, entire, with triangular stipules; petioles moderate; flowers white, small, in dense globular heads, axillary; fruit a small achene in dense globular heads, tan-colored.

**WINTER** : twigs terete, red-brown with light lenticels, dying back at the tips, glabrous; pith small, angular; leaf scars opposite or whorled (often 3 at a node), roundish, raised, with one bundle trace, and with evident stipule scars or the stipules persisting; buds small, often superposed, conical, indistinctly scaly, in depressed pockets; end-bud lacking.

**CEANOTHUS AMERICANUS** is recognized thus

**SUMMER** : leaves alternate, simple, moderately large, odorless, ovate to oblong-ovate, acute or acuminate, irregularly serrate, with three main veins from the base, pubescent or nearly glabrous beneath, with small stipules; flowers small, white, in terminal and axillary racemes or panicles; fruit a capsule, 3-lobed at the apex, finally splitting into 3 dehiscent parts, the cuplike receptacles persisting.

**WINTER** : low shrub, unarmed; twigs terete, puberulent, rather slender, brown or greenish-brown; leaf-bundle alternate, 3-round, slightly raised, small, with one transverse, evidently compound pubescent, with few outer scales of which only the lower ones are distinct.

**CHIONANTHUS VIRGINICA** is recognized thus

**SUMMER** ; leaves opposite, simple, entire, petiolate, oblong, stipulate; inflorescence in racemes or panicles dioecious; flowers white, in drooping panicles, from lateral buds, petals long and narrow;

fruit a dark blue drupe, one-seeded.

**WINTER** : Bark firm; twigs gray, squarish, especially at the nodes, pubescent while young; pith continuous and persistent; leaf scars opposite, relatively broad, crescent-shaped, raised, not large, with one transverse bundle trace and no stipule scars; buds superposed, sessile, round-ovoid, relatively small, with about six stiff, pointed, keeled scales.

**CLETHRA ALNIFOLIA** is recognized thus

**SUMMER** : leaves alternate, toothed but not lobed, pinnately veined, serrate, glabrous, stipulate, short-petioled; flowers white, very fragrant, in terminal panicles, racemes; fruit a small subglobose capsule, splitting in 3 valves, persistent.

**WINTER** : unarmed shrub; twigs brown, older twigs glaucous near tip, younger twigs scurfy tomentulose, then stellate-pubescent, obscurely triangular; leaf scars alternate, clustered near tip, triangular, low, with one bundle trace and no stipule scars; buds small, loosely scaled, solitary, sessile, ovoid.

CEANOTHUS --

CEPHALANTHUS --

CHIONANTHUS --

CLETHRA

COMPTONIA PEREGRINA\* is recognized thus

SUMMER : leaves alternate, simple, petiolate, linear-oblong, deeply pinnatifid, with round-ovate, oblique, mucronulate lobes, pubescent, pungent when bruised; flowers in catkins; fruit an ovoid nutlet, glabrous, subtended by elongated, awl-like bracts.

WINTER : an aromatic shrub; twigs terete or angular, slender, resinous-dotted while young; pith small, green; leaf scars alternate,  $\frac{1}{2}$ -elliptical or triangular, more or less raised, with 3 bundle traces and small stipule scars; buds small, solitary, subglobose, sessile, with 2-4 outer scales; end-bud lacking.

COMPTONIA (syn. Myrica)

The Genus CORNUS is recognized thus

SUMMER : erect, deciduous, unarmed shrubs; twigs reddish or greenish; leaves opposite except in one species, viz. *alternifolia*, petioled, entire, with anastomosing veins; flowers in terminal cymes or heads, small, often surrounded by involucre bracts; fruit a small drupe.

| species             | arrangement | under side of leaves               | pith              | fruit   | involucre                     | flowers                      | floral color | pubescence                       | leaves                                    | lateral buds   | habit             | twig color   |
|---------------------|-------------|------------------------------------|-------------------|---|-------------------------------|------------------------------|--------------|----------------------------------|---|----------------|-------------------|--------------|
| <i>alternifolia</i> | alternate   | hairs irregularly diverging        |                   |   |                               |                              |              |                                  | cuneate                                   |                |                   |              |
| <i>amomum</i>       | opposite    | light green, veins rusty-pubescent | brown             | blue, spherical                               |                               |                              |              | woolly, spreading                | only the veins pubescent                  |                |                   | red-violet   |
| <i>sanguinea</i>    | "           | light gr., villous                 | white             | black   |                               |                              |              | "                                | 2-5 veins petiole shortish                |                |                   | greenish     |
| <i>mas</i>          | "           | "                                  | "                 | red, elliptical, pedicel short                | deciduous                     | dense umbels, with involucre | yellow       | not woolly, glabrous             |   | very divergent |                   |              |
| <i>florida</i>      | "           | whitened beneath                   | "                 | "   | showy, with emarginate bracts | in flower-like heads         | white        | "                                |   |                |                   |              |
| <i>kousa</i>        | "           | "                                  | "                 | "   | showy, with acuminate bracts  | united in a globose flower   | "            | "                                |   |                |                   |              |
| <i>baileyi</i>      | "           | "                                  | "                 | white spherical                               | lacking                       | cymose                       | white        | woolly, spreading subappressed   | ovate-lanceolate, loosely hairy beneath   | stalked        |                   | brownish-red |
| <i>stolonifera</i>  | "           | "                                  | "                 | "   | "                             | "                            | "            | closely appressed or glabrescent | ovate, acuminate, glabrous                | sessile        | stoloniferous     | red          |
| <i>alba</i>         | "           | "                                  | "                 | elliptical, stone compressed                  | "                             | cymes flat                   | "            | "                                | ovate or elliptic, acute, whitish beneath | long-stalked   | erect, osier-like | bright red   |
| <i>racemosa</i>     | "           | "                                  | white or brownish | white with red pedicels, stone not compressed | "                             | cyme paniculate, convex      | "            | "                                | lanceolate                                |                | erect, twiggish   | grayish      |

CORNUS

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Summer Key



The Genus CORNUS is recognized in

WINTER : erect, deciduous, unarmed shrubs with red or green branches; leaf scars opposite, rarely alternate, meeting around the twig, small, narrow, in four ranks, with 3 bundle traces; pith continuous and persistent; winter buds elongated, with 2 valvate scales, axillary buds appressed.

| species      | arrangement | fruit color            | twig color                     | fruits                                      | flower buds                      | leaf scars           | habit                           | buds and twigs                | branchlets           | lateral buds                    | pith     |
|--------------|-------------|------------------------|--------------------------------|---|----------------------------------|----------------------|---------------------------------|-------------------------------|----------------------|---------------------------------|----------|
| alternifolia | alternate   | bluish, bloomy         | green                          | united into a globose fleshy head           | enlarged, flattened vertically   | raised covering buds | stratified                      |                               | gla-brous            | con-cealed                      |          |
| kousa        | opposite    | red                    |                                | individually distinct but in dense clusters | "                                | "                    | "                               |                               | soon gla-brous       |                                 |          |
| florida      | "           | "                      | "                              | "   | enlarged, not flattened, obovate | not as above         | erect, less stratified          |                               | minute-ly ap-pressed | not con-cealed, very di-vergent |          |
| mas          | "           | "                      | "                              | "   |                                  |                      |                                 |                               |                      |                                 |          |
| racemosa     | "           | white, on red pedicels | grayish                        | in loose cymes                              | not enlarged                     | "                    | erect, twiggy                   |                               | silky-hairy          | sub-erect                       |          |
| anomum       | "           | blue                   | purplish-red                   | "   | "                                | "                    | ascending spreading             | pubescent                     | woolly               | sub-erect or nearly sessile     | brownish |
| sanguinea    | "           | black                  | green with upper side deep red | "   | "                                | "                    | "                               | hairy all over                | "                    | sessile or almost so            | white    |
| baileyi      | "           | bluish-white           | red                            | "   | "                                | "                    | loose and osierlike             | buds hairy, twigs scarcely so | glabrous             | stalked                         | "        |
| alba         | "           | "                      | "                              | "   | "                                | "                    | more erect, loose and osierlike | glabrous                      | "                    | long-stalked                    | "        |
| stolonifera  | "           | "                      | "                              | "   | "                                | "                    | stoloniferous                   | "                             | "                    | not stalked                     | "        |

CORNUS -- Winter Key

The Genus *CORYLUS* is recognized thus

**SUMMER** : twigs moderate, zigzag, pubescent; leaves alternate, ovate, doubly serrate, more or less pubescent; flowers in catkins; fruit an ovoid nut in a thin, fringed or toothed involucre.

**WINTER** : an erect shrub with moderate, zigzag, pubescent twigs; buds alternate, solitary, sessile, set obliquely to the scar, ovoid and obtuse, with several to many exposed scales which are greenish in color with brown edges; end-bud lacking; leaf scars 2-ranked, half-round or triangular, a little raised, with 3 bundle traces and long stipule scars; flower-buds in catkins.

# Summer Key

| species   | branchlets          | involucre     | involucral bracts                        | leaves   |
|-----------|---------------------|---------------|--|--|
| avellana  | glandular-pubescent | of two bracts | not or only slightly longer than the nut | suborbicular to broad-obovate, often slightly lobulate |
| americana | "                   | "             | about twice as long as the nut, closed   | broad-ovate or oval                                    |
| cornuta   | slightly hairy      | tubular       |  | ovate to obovate                                       |

# Winter Key

| species   | buds  | fruit   |
|-----------|---|---|
| avellana  | small, glabrescent                                      | husk open, hardly longer than the nut                 |
| americana | small, gray-pubescent; persistent                       | husk closed or longer than the nut, frilled           |
| cornuta   | gray-pubescent, outer scales elongated, quickly falling | husk closed or longer than the nut, beaked or tubular |

The Genus COTONEASTER is recognized in

SUMMER : erect or sprawling shrubs; leaves simple, usually smallish, entire, short-petioled, alternate, with awl-like stipules; flowers white or pinkish, small and not conspicuous, terminal on short lateral branchlets; fruit a small drupe-like pome or pome-like drupe with persistent, incurving sepals, and 2-5 stones.

WINTER : twigs slender, rounded; leaf-scars alternate, minute, elliptical, raised, with one indistinct bundle trace and persistent stipules; buds solitary, sessile, ovoid or oblong, with the outer scales parted and showing the hairy bud inside.

| species      | character                  | habit     | leaves                         | under side of leaves                         | upper side of leaves | inflorescence         | branches and twigs     | flowers               | size of leaves   | buds  | fruit             |
|--------------|----------------------------|-----------|--------------------------------|--|----------------------|-----------------------|------------------------|-----------------------|------------------|---|-------------------|
| microphylla  | evergreen or sub-evergreen |           | obovate margin wavy            | densely hairy                                |                      |                       |                        | petals spreading      |                  |   | red               |
| horizontalis | "                          |           | round-oval                     | sparingly strigose-pubescent                 | lustrous             |                       | horizontally spreading | with up-right petals  |                  |   | red               |
| rotundifolia | "                          |           | "                              | hairy when young, soon glabrous              | dull                 |                       | "                      | "                     |                  |   | "                 |
| dameri       | "                          |           | elliptic                       | "  | lustrous             |                       | trailing and rooting   | with spreading petals |                  |   | "                 |
| adpressa     | deciduous                  | prostrate | margin wavy                    |  |                      |                       |                        |                       |                  |   | "                 |
| zabelli      | "                          | erect     | apex mostly obtuse             | yellow tomentose                             |                      |                       |                        |                       | one inch or less |   | "                 |
| dielsiana    | "                          | "         | apex mostly acute              | "  |                      |                       |                        |                       | "                |   | "                 |
| hupehensis   | "                          | "         | apex obtuse or grayish acutish | thinly tomentose                             |                      | many-flowered corymbs |                        | calyx villous         | "                |   | "                 |
| divaricata   | "                          | "         | obtusish                       | glabrous or slightly pubescent on the midrib |                      | few flowered cymes    | glabrescent            |                       | "                |   | "                 |
| racemiflora  | "                          | "         | sub-orbicular, obtuse          | white-tomentose                              |                      | many flowered corymbs | gray-tomentose         | calyx tomentose       | "                |   | "                 |
| intertrigima | "                          | "         | obtusish                       | whitish or grayish tomentose                 |                      |                       |                        |                       | 1 inch or more   | outer scales glabrescent, larger to smaller       | large             |
| acuminata    | "                          | "         | acute                          | glabrescent                                  |                      |                       |                        |                       | "                | glabrate to medium to large or persistently hairy | red, not glaucous |
| foveolata    | "                          | "         | mostly acuminate               | pubescent chiefly on the veins               |                      |                       |                        |                       | "                |   | black             |
| acutifolia   | "                          | "         | mostly acute                   | glabrescent                                  |                      |                       |                        |                       | "                | smaller, persistently hairy                       | "                 |

COTONEASTER

-- Summer Key

For winter identification of the Genus COTONEASTER see preceding page

| species             | habit                                       | fruit                                      | branchlets                                  | buds                                       | twig color                  | pubescence                   | fruit               | fruit position                | sepals |
|---------------------|---|--|---|--|-----------------------------|------------------------------|---------------------|-------------------------------|--------|
| <i>acutifolia</i>   | spreading bushy                             | black                                      | moderate                                    | smallish, persistently hairy               | red-brown to very dark      | twigs hairy                  |                     |                               |        |
| <i>foveolata</i>    | spreading                                   | "  | "   | large, sub-glabrescent                     | gray-brown to straw color   | "                            |                     |                               |        |
| <i>racemiflora</i>  | spreading and ascending                     | glaucous red                               | moderate, rigid                             | small, silky at first, finally glabrescent |                             |                              |                     |                               |        |
| <i>hupehensis</i>   | erect and arching                           | red, not glaucous                          | very slender, purplish to red-brown         | small glabrate                             | yellowish                   | finally glabrate             |                     |                               |        |
| <i>dielsiana</i>    | erect arching                               | red, small, hairy at apex                  | moderate dark brown                         | smallish to larger, and persistently hairy | "                           | densely gray-woolly          |                     | on lateral spurs, not nodding |        |
| <i>divaricata</i>   | spreading                                   | red, oblong                                | slender                                     | small, persistently hairy                  | rusty-brown                 | glabrescent at least later   |                     |                               | erect  |
| <i>zabeli</i>       | "   | "  | "   | "  | rusty-brownish to very dark | branchlets densely pubescent |                     |                               |        |
| <i>intermedia</i>   | upright, bushy                              | hanging, red, large, glaucous              | moderate                                    | larger, glabrescent or persistently hairy  | "                           | "                            | glaucous red        | nodding, axillary, large      |        |
| <i>acuminata</i>    | "   | red, large, ellipsoid, pubescent near apex | moderate dull dirty gray to reddish         | larger, glabrate pointed                   | densely pale-brown woolly   | "                            | pubescent near apex |                               |        |
| <i>adpressa</i>     | prostrate with creeping stems               | red  | strigose, pubescent, irregularly distichous |  |                             |                              |                     |                               |        |
| <i>horizontalis</i> | sub-evergreen spreading, regularly branched | red  | strigose                                    |  |                             |                              |                     |                               |        |

CYDONIA JAPONICA (Chaenomeles lagenaria) is recognized thus

SUMMER : leaves alternate, simple, toothed but not lobed, short-petioled, ovate to oblong, serrate, lustrous and glabrous, with often leaf-like stipules; branches often with terminal and lateral thorns; flowers red, varying from white to pink to deep red and orange; fruit a fairly large yellow pome.

WINTER : a much-branched shrub, with or without thorns; twigs moderate, terete, glabrous, orange or reddish, rigid, with or without terminal and axillary twig spines; leaf scars alternate, small, linear or crescent-shaped or narrowly triangular, raised, with 3 minute bundle traces and with rather long stipule scars; buds sessile, small, solitary becoming multiple, round-ovoid, with few outer scales; end-bud lacking.

CYTISUS SCOPARIUS is recognized thus

SUMMER : a small to moderate sized shrub with green stems; leaves alternate, simple or more usually 3-parted, sometimes minute or lacking, and with minute or absent stipules; leaflets obovate or oblanceolate with few appressed hairs while young, entire; flowers yellow, usually solitary, axillary, the style longer than the keel; fruit a flat, linear-oblong, dehiscent pod with villous margins, the seeds with a thickened and hardened appendage.

WINTER : unarmed and odorless; branchlets bright green, prominently ridged or angled, even almost winged; leaf scars alternate, very small, raised, with one indistinct bundle trace and minute stipule scars; buds small, solitary, sessile, round-ovoid, with about four often indistinct scales.

The Genus DEUTZIA is recognized thus






SUMMER : erect shrubs with peeling bark; leaves opposite, short-petioled, serrate, without stipules; flowers in panicles or cymes, usually terminal on lateral branchlets, white or pinkish; fruit a 3-5-valved capsule, indehiscent.

WINTER : erect shrubs with brown, peeling bark; branches usually hollow; twigs terete, usually dying back at the tip; pith moderate, round, pale and spongy or brown and excavated; leaf scars opposite, 4-ranked, linear or triangular, with 3 bundle traces and no stipule scars; buds ovoid, nearly sessile, with several pairs of outer scales.

# Summer Key

| species    | habit | pith             | petals                             | inflorescence               | under side of leaves |
|------------|-------|------------------|------------------------------------|-----------------------------|----------------------|
| scabra     | to 6' | brown, excavated | erect, blushed, oblong             | broad, loose panicle        | rough pubescent      |
| rosea      | to 3' | white            | "                                  | "                           |                      |
| gracilis   | to 3' | "                | erect, white, oblong               | elongated panicle or raceme | glabrous             |
| lemoinei   | to 4' | "                | spreading, white, broadly ovate    | corymbs or cymes            | glabrous             |
| parviflora | to 6' | "                | spreading, white, roundish-obovate | "                           | nearly glabrous      |
|            |       |                  |                                    |                             | stellate pubescent   |

# Winter Key

| species    | pith             | buds                       | bud scales | bud size                 | leaf scars   |
|------------|------------------|----------------------------|------------|--------------------------|--|
| scabra     | brown, excavated |                            |            |                          |  |
| parviflora | white            | ovoid, canescent           | acute      |                          |   |
| lemoinei   | "                | glabrate, brownish, ovoid  | attenuate  | longer than lowest scale |   |
| rosea      | "                | glabrate, brownish, oblong | "          | not so                   |   |
| gracilis   | "                | glabrate, brownish         | "          | triangular               |   |
|            |                  |                            |            | linear                   |  |



DIRCA PALUSTRIS is recognized thus

SUMMER : an unarmed shrub with the branchlets enlarged upwards; leaves alternate, simple, entire, short-petioled, obovate, obtuse, cuneate, glaucescent beneath; leaf petioles enclosing and concealing the buds; flowers before the leaves, apetalous, short-stalked, pale yellow, in axillary clusters of 2-3 on old wood; fruit a pale green or reddish drupe, ellipsoid.

WINTER : a shrub with soft wood and very, very tough bark, unarmed, odorless; twigs flexible, enlarged upwards, glabrous, brownish with white lenticels, terete; leaf scars alternate, scalloped, almost encircling the bud, 2-ranked, elevated at the swollen nodes, with 5 bundle traces and no stipule scars; buds small, short-conical, solitary, sessile, with about 4 indistinct dark silky scales; end-bud lacking.

The ELAEAGNACEAE may be recognized both summer and winter by the silvery or brown scales which clothe the twigs and branches and leaves and buds.

| Genus      | species      | arrangement | foliage   | thorns   | twigs                           | winter buds  | fruit                       | leaf margin          | leaves             | flowers & fruits |
|------------|--------------|-------------|-----------|----------|---------------------------------|--|-----------------------------|----------------------|--------------------|------------------|
| Shepherdia | rotundifolia | opposite    | evergreen |          |                                 |  |                             |                      |                    |                  |
|            | argentea     | "           | deciduous | present  | silvery                         |  |                             |                      |                    |                  |
|            | canadensis   | "           | "         | without  | brown scurfy                    |  |                             |                      |                    |                  |
| Hippophae  | rhamnoides   | alternate   | "         | terminal | gray-silvery, end in spines     | brown scurfy   | bright orange, poisonous    |                      | very slender       |                  |
| Elaeagnus  | angustifolia | "           | "         | lateral  | with silvery scales, none brown | no brown scales  | dry, yellow, not persistent | entire, not crisped  |                    |                  |
|            | argentea     | "           | "         | without  | with brown scales               | with some brown scales, end-bud conical-ovoid              | dry, silvery, soon gone     |                      | silvery both sides |                  |
|            | multiflora   | "           | "         | "        | "                               | dark, red-brown, subglobose                                | red, juicy, soon gone       | more or less crisped | silvery beneath    | pendent          |
|            | umbellata    | "           | "         | "        | silvery, with few brown scales  | with few brown scales, small, appressed, end-bud elongated | red, juicy, persisting      | much crisped         | silvery beneath    | erect            |

sequence of bloom and fruiting

|                       |              |           |              |
|-----------------------|--------------|-----------|--------------|
| argentea - flowers in | June         | fruits in | August ff.   |
| angustifolia          | May, June    | "         | July, August |
| multiflora            | " April, May | "         | June, July   |
| umbellata             | " May, June  | "         | September    |

DIRCA -- ELAEAGNACEAE

The Genus *EUONYMUS* is recognized thus

SUMMER : deciduous or evergreen shrubs, sometimes creeping or climbing by rootlets; twigs moderate, rounded or 4-lined from the nodes or 4-angled or 4-winged, characteristically green; pith glabrous; flowers in axillary cymes, floral parts in 4's or 5's; fruit a 4-5 celled, lobed capsule (occasionally 2-3 celled); capsule pink or pinkish, orange within, and with black seeds.

| species      | foliage   | habit          | leaves                           | branchlet color | twigs                 | fruit       | buds                                | capsule color                  |
|--------------|-----------|----------------|----------------------------------|-----------------|-----------------------|-------------|-------------------------------------|--------------------------------|
| radicans     | evergreen | trailing       | broadly oval, dull above         |                 |                       |             |                                     |                                |
| japonica     | "         | erect          | elliptic to oblong, bright green |                 |                       |             |                                     |                                |
| obovata      | deciduous | low, prostrate | obovate                          |                 |                       |             |                                     |                                |
| yedoensis    | "         | erect          | obovate, large and coarse        | orange          |                       |             | ovoid, scales with long points      |                                |
| alata        | "         | "              | not as above                     | greenish        | winged                |             |                                     |                                |
| americana    | "         | "              | "                                | green           | not winged, square    | tuberculate | slender pointed divergent           | deep rose-red                  |
| europa       | "         | "              | "                                | "               | terete, often 4-lined | smooth      | less slender, less divergent obtuse | deep rose-pink                 |
| bungeana     | "         | "              | "                                | "               | "                     | "           | buds elongated, appressed           | very pale yellowish or pinkish |
| atropurpurea | "         | "              | "                                | purplish        | "                     | "           | oblong, with loose, oblong scales   | violet-red                     |

EUONYMUS -- Summer Key

The Genus EUONYMUS is recognized thus

WINTER : shrubs with moderate twigs, rounded or 4-lined or 4-angled or 4-winged, characteristically green; pith angled or rounded, spongy or incompletely excavated; leaf scars opposite or nearly so, half-elliptical, rather small, slightly elevated, with one bundle trace and minute, indistinct stipule scars; buds with imbricate scales, solitary, sessile, with 3-5 pairs of serrulate scales.

| species       | foliage   | habit                | twigs                 | fruit                        | bud scales              | buds                      | twig color                   |
|---------------|-----------|----------------------|-----------------------|------------------------------|-------------------------|---------------------------|------------------------------|
| obovata       | deciduous | low, prostrate erect |                       |                              |                         |                           |                              |
| alata         | "         |                      | corky winged          |                              |                         |                           |                              |
| americana     | "         | "                    | not winged, square    | tuberculate                  |                         | oblong, pointed, upcurved |                              |
| europa        | "         | "                    | terete, often 4-lined | smooth, 4-lobed lobes obtuse | appressed, dry-margined | ovoid, obtuse             | green                        |
| yedoensis     | "         | "                    | "                     | large, pale pink             | long-pointed            | ovoid                     | twigs green, branches orange |
| bungeanus     | "         | "                    | "                     | very pale pinkish-yellow     |                         | slightly elongated        | green                        |
| atropurpureus | "         | "                    | "                     | violet-rose                  | loose, oblong           | oblong                    | purplish                     |
| japonica      | evergreen | "                    |                       |                              |                         |                           |                              |
| radicans      | "         | trailing or climbing |                       |                              |                         |                           |                              |

EUONYMUS -- Summer Key

EXOCHORDA GRANDIFLORA is recognized thus

SUMMER : a large shrub; leaves alternate, simple, oblong, cuneate, toothed near the tip, glabrous, glaucous beneath, with one main vein; flowers white with green centers, in loose, terminal racemes; fruit a 5-lobed capsule, persistent, separating into 5 bony sections, finally dehiscent; seeds winged

WINTER : unarmed and odorless; bark reddish, freely peeling, inner bark orange, branches gray-brown; twigs slender, glabrous, terete, roughened with lenticels and longitudinal fissures; leaf scars alternate, narrow, shallowly V-shaped or linear, raised, with 3 bundle traces and no stipule scars; buds moderate, solitary, sessile, ovoid with pointed and fringed scales.

EUONYMUS -- Winter Key -- EXOCHORDA

The Genus FORSYTHIA is recognized thus

SUMMER : loose shrubs with yellowish twigs and very bright green foliage; leaves opposite, petiolate, glabrous, occasionally 3-parted, usually serrate; flowers very early, yellow, bell-shaped, axillary, with four oblong lobes; fruit a 2-celled, dehiscent capsule.

WINTER : loosely branched or scrambling shrubs with yellowish twigs and opposite arrangement; twigs somewhat angled, buds moderate and multiple, sessile, with about six pairs of scales; leaf-scars opposite, shield-shaped, rather small, raised, with one bundle trace and no stipule scars.

Summer and Winter Keys combined

| species     | habit        | twig color        | pith  | flowers           | leaves                                       |
|-------------|--------------|-------------------|---|-------------------|--|
| viridissima | erect, stiff | a little greenish | chambered or all excavated (through nodes and internodes) | with pistil long  | long, narrow, plain outline                  |
| intermedia  | arching      | yellowish         | solid at nodes, internodes chambered                      | with pistil short | elongated, partly lobed or divided on shoots |
| suspensa    | pendulous    | yellowish         | nodes solid, internodes excavated                         | "                 | broad  |

N.B. F. suspensa var. fortunei is rather erect in growth.

GAYLUSSACIA BACCATA is recognized thus

SUMMER : deciduous; leaves alternate, short-petioled, entire, with resin-glands above and below; flowers in dense but short racemes, axillary; fruit a berrylike drupe with 10 one-seeded nutlets, calyx persistent; seeds solitary in each fruit cell.

WINTER : twigs slender, terete, with a small pith, young growth resinous-dotted; leaf scars alternate, low, crescent-shaped or triangular, with one bundle trace and no stipule scars; buds solitary, sessile, ovoid, with 2-5 outer scales; end-bud lacking.

GENISTA TINCTORIA

is recognized thus

SUMMER : unarmed; leaves alternate, simple, glabrous beneath, ciliate, elliptic-oblong to oblong-lanceolate, entire, usually with small stipules; flowers yellow, in many-flowered, terminal racemes; fruit a linear-oblong pod, compressed but not flat, glabrous or glabrescent.

WINTER : upright or ascending, with the slender, bright green twigs not much branched; twigs ribbed or grooved, terete, glabrous; leaf scars alternate, much-raised, minute, with one indistinct bundle trace, and the stipules more or less persistent.

FORSYTHIA    --    GAYLUSSACIA    --    GENISTA

The Genus *HAMAMELIS* is recognized thus

**SUMMER** : erect shrubs with yellowish pubescent branchlets; leaves alternate, short-petioled, lopsided, sinuate-dentate, with large stipules which fall off early; flowers yellow, with strap-shaped petals, in short-peduncled, axillary, few-flowered clusters, occurring in autumn; fruit a tomentose, 2-valved capsule.

**WINTER** : twigs yellowish-pubescent or tomentose at first; leaf scars alternate, 2-ranked, half-round or 3-lobed, slightly raised, with 3 bundle traces and unequal stipule scars, one round and one elongated; buds naked, oblong, stalked, tomentulose.

#### Summer and Winter Keys combined

| species           | leaves                       | buds            | flowers        | fruit                            | calyx                  |
|-------------------|------------------------------|-----------------|----------------|----------------------------------|------------------------|
| <i>virginiana</i> | obovate or elliptic          | short (5-8 mm.) | in late autumn | surrounded to 1/2 by the calyx   | brownish-yellow inside |
| <i>vernalis</i>   | obovate, glaucescent beneath | short (5-8 mm.) | in late winter | surrounded to 1/2 by the calyx   | dark red inside        |
| <i>japonica</i>   | broad-ovate, green beneath   | long (10 mm.)   | in late winter | surrounded at base only by calyx | red or purple inside   |

*HIBISCUS SYRIACUS* is recognized thus

**SUMMER** : leaves alternate, simple, 3-lobed, ovate or rhombic-ovate, coarsely toothed above the middle, cuneate, short-petioled, palmately veined, glabrous, estipulate; flowers rather large and conspicuous, solitary, axillary; fruit a capsule, dehiscent into 5 valves; seeds flattened, with a ring of gray hairs about the margin.

**WINTER** : bark gray, firm; twigs terete, but fluted near the dilated tip and terminated by relatively large, roundish flower and fruit scars; pith white, green margined; leaf scars alternate, crowded near the ends of twigs, 3-round or transversely elliptical, raised, with ridges extending below, and with 4 compound and irregular, often indefinite bundle traces, stipule scars small, elliptical.

*HAMAMELIS*      --      *HIBISCUS*

The Genus HYDRANGEA is recognized thus

**SUMMER :** erect or climbing shrubs with peeling bark; leaves opposite or whorled, petiolate, usually serrate, rarely lobed, without stipules; flowers in terminal corymbs or panicles, often with sterile marginal flowers; fruit a 2-5 celled capsule opening at the apex.

**WINTER :** soft-wooded shrubs or root-climbers; deciduous; twigs rounded, with a large, continuous, pale pith; leaf scars opposite or whorled, crescent-shaped, rather large, scarcely raised, free-stipule scars: buds moderate, solitary, sessile or very short-stalked, globose-conical to oblong, with 2-3 pairs outer scales.

#### Summer Key

| species     | habit    | twigs                 | leaves    | flowers and fruits |
|-------------|----------|-----------------------|-----------|--------------------|
| petiolaris  | climbing |                       |           |                    |
| quercifolia | shrubby  | tomentose, orange-red | lobed     |                    |
| paniculata  | shrubby  | glabrate              | not lobed | paniculate         |
| arborescens | shrubby  | glabrate              | not lobed | flat-topped cymes  |

#### Winter Key

| species     | bark     | buds                            |
|-------------|----------|---------------------------------|
| petiolaris  | climbing |                                 |
| quercifolia | shrubby  | tomentose, orange-brown flaking |
| paniculata  | shrubby  | brown, firm                     |
| arborescens | shrubby  | yellow, firm                    |
|             |          | round, conical, horizontal      |
|             |          | spreading, oblong               |

HYDRANGEA



The Genus **HYPERICUM** is recognized thus

**SUMMER** : leaves opposite, short-petioled or sessile, entire, dotted with transparent glands, without stipules; flowers yellow, in terminal or axillary cymes, with numerous stamens; fruit a capsule dehiscing along the partitions.

**WINTER** : small shrubs with peeling bark; twigs slender, angled below the nodes; pith small, green or brown, spongy and finally excavated; leaf scars opposite, sometimes whorled, rhomboid or lens-shaped, scarcely raised, with one bundle trace and no stipule scars; buds solitary, sessile, minute, with several scales.

#### Summer Key

| species     | stems             | flowers                  | flower clusters | number of styles | leaves                        | cymes                     |
|-------------|-------------------|--------------------------|-----------------|------------------|-------------------------------|---------------------------|
| moserianum  | terete or 2-edged | in 1-3 flowered clusters |                 | five             | narrow ovate                  |                           |
| calycinum   | 4-angled          | solitary                 |                 | "                | "                             |                           |
| lobocarpum  | "                 | in cymes                 | many-flowered   | "                | linear-oblong to lanceolate   |                           |
| kalmianum   | "                 | "                        | few-flowered    | "                | linear-oblong                 |                           |
| densiflorum | "                 | "                        | " terminal      | three            | "                             | forming a terminal corymb |
| prolificum  | 2-angled          | "                        | axillary        | "                | narrow-oblong or oblanceolate | axillary                  |

#### Winter Key

| species     | stems            | angles of stem      | buds                             | habit                            | inflorescence             | capsule             | furrows of capsule |
|-------------|------------------|---------------------|----------------------------------|----------------------------------|---------------------------|---------------------|--------------------|
| moserianum  | terete           |                     |                                  | sub-shrub 2' high                |                           |                     |                    |
| prolificum  | winged or angled | two, not persistent |                                  | stout, dense shrub               |                           |                     |                    |
| calycinum   | "                | four, persistent    | distinctly scaly                 | low, small shrub, stoloniferous  |                           |                     |                    |
| kalmianum   | "                | "                   | scarcely with specialized scales | openly bushy, branches contorted | few-flowered cymes        | ovoid               | 5-angled           |
| lobocarpum  | "                | "                   | "                                | upright, bushy                   | many-flowered cymes       | oblong              | "                  |
| densiflorum | "                | "                   | "                                | erect, stiff and dense           | in large terminal corymbs | completely 3-celled | 3-angled           |

#### HYPERICUM

*ILEX VERTICILLATA* is recognized thus

- SUMMER : leaves alternate, of moderate size, simple, narrow elliptic or obovate, serrate, acute, cuneate, with impressed veins, estipulate; flowers solitary, axillary, small, whitish, short-stalked; fruit a bright red, globose drupe, holly-like, persistent.
- WINTER : an odorless and thornless shrub with smooth dark gray bark; twigs smooth gray, sometimes streaked lighter gray on the upper side; pith green; leaf scars more or less raised, with one bundle trace and minute stipule scars; buds smooth gray streaked light gray, firm and hard, with 2-4 imbricate scales, sessile, superposed.

*KOLKWTZIA AMABILIS* is recognized thus

- SUMMER : leaves opposite, simple, broad-ovate, short-petioled, acuminate, base rounded, margin shallowly toothed or entire, ciliate, hairy beneath; flowers pink with a yellow throat, puberulent, paired forming terminal corymbs on short lateral twigs; fruit a capsule, ovoid, gray-tan, very bristly-hairy.
- WINTER : a shrub with freely peeling, gray-brown bark; twigs gray, pilose, with continuous white pith; very much like the Honeysuckles; leaf scars opposite, crescent-shaped or triangular, raised, connected by a line around the twig, with 3 bundle traces often confluent, and no stipule scars; buds gray-velvety, sessile, solitary, ovoid, with 3-4 pairs of scales.

*KERRIA JAPONICA* is recognized thus

- SUMMER : leaves alternate, simple, oblong-ovate, acuminate, doubly serrate; flowers yellow, solitary, perfect, with numerous stamens; fruit a dark brown achene.
- WINTER : an unarmed, odorless shrub; twigs bright green, slender, zigzag, 5-angled or ridged, glabrous, pith relatively large, white, continuous; leaf scars alternate, small, 2-ranked, crescent-shaped or triangular, slightly raised, with 3 bundle traces and no stipule scars; buds small, solitary, sessile, oblong, with about 5 outer scales, sub-appressed.

|      |    |        |    |           |
|------|----|--------|----|-----------|
| ILEX | -- | KERRIA | -- | KOLKWTZIA |
|------|----|--------|----|-----------|

The Genus *LIGUSTRUM* is recognized thus

SUMMER : leaves opposite, simple, entire, short-petioled; flowers white, smallish, in terminal panicles; corolla lilac-like; fruit a 1-4 seeded berry-likedrupe, black or bluish-black.

Summer Key

| species          | leaf scar    | fruit color     | branches   | leaves                          | leaf tip | lenticels | habit                       | fruit               |
|------------------|--------------|-----------------|------------|---------------------------------|----------|-----------|-----------------------------|---------------------|
| ovalifolium      | broad as bud |                 | glabrous   |                                 |          |           |                             |                     |
| vulgare          | narrow       | black, glossy   | "          |                                 |          |           |                             |                     |
| acuminatum       | "            | "               | pubescent  | pubescent above near the margin | acute    |           |                             |                     |
| amurense         | "            | dull blue-black | "          | glabrous above                  | obtuse   | prominent |                             |                     |
| ibota            | "            | "               | "          | "                               | "        | low       | tall, arching               | nodding, pedicelled |
| ibota regelianum | "            | "               | "          | "                               | "        | "         | low, spreading horizontally | "                   |
| quihoui          | "            | "               | puberulent | "                               | "        | "         |                             | sessile             |

*LIGUSTRUM* -- Summer Key

The Genus *LIGUSTRUM* is recognized thus

WINTER : deciduous but holding the leaves very late; twigs slender, round; pith moderate, white; leaf scars opposite or almost so, small, crescent-shaped or elliptical, raised, with one bundle trace and no stipule scars; buds small, sessile, ovoid, with 2-3 pairs of outer scales, occasionally superposed.

Winter Key

| species          | leaf scar    | branches   | fruit color      | lenticels | habit                     | fruit                      |
|------------------|--------------|------------|------------------|-----------|---------------------------|----------------------------|
| ovalifolium      | broad as bud | glabrous   |                  |           |                           |                            |
| vulgare          | narrow       | "          | black, glossy    |           |                           |                            |
| acuminatum       | "            | pubescent  | "                |           |                           | terminal in line of branch |
| amurense         | "            | "          | dull, blue-black | prominent |                           |                            |
| ibota            | "            | "          | "                | low       | tall, arching             |                            |
| ibota regelianum | "            | "          | "                | "         | low, spreading horizontal | nodding, pedicelled        |
| quihoui          | "            | puberulent | "                | "         | "                         | "                          |
|                  |              |            |                  |           |                           | sessile                    |

LINDERA BENZOIN -- see Benzoin aestivale

LIGUSTRUM --- Winter Key - LINDERA

The Genus LONICERA is recognized thus

SUMMER : leaves opposite, usually short-petioled or sessile, entire, without stipules; flowers in axillary, peduncled pairs, each with 2 bracts and 4 bractlets; corolla tubular; fruit a berry.

| species         | habit                      | flowers and fruits           | pith              | floral color                      | upper lip of corolla | leaves  | leaf tip           | winter buds  | bractlets                     | peduncles             |
|-----------------|----------------------------|------------------------------|-------------------|-----------------------------------|----------------------|---|--------------------|--|-------------------------------|-----------------------|
| semper-virens   | climbing                   | terminal, interrupted spikes |                   | red trum-pet with yellow interior |                      | glabrous, glaucous  |                    |  |                               |                       |
| japonica        | "                          | axillary pairs               |                   | white to yellow                   |                      | pubescent   |                    |  |                               |                       |
| fragrant-issima | shrubby spreading tangled  | "                            | white             | "                                 |                      | broadly ovate or oval to obovate obtusish very smooth almost glabrous | acute or obtusish  |  |                               |                       |
| stand-ishi      | shrubby ascending          | "                            | "                 | "                                 |                      | oblong-ovate acuminate bristly hairy                                  | acuminate          |  |                               |                       |
| korolkowi       | "                          | "                            | brown, ex-cavated | pink, not changing to yellow      | divided to middle    | 1" or less pubescent  | acute or obtusish  |  |                               |                       |
| tatar-ica       | "                          | "                            | "                 | "                                 | divided to base      | 1" or more glabrous   | "                  |  |                               |                       |
| bella           | "                          | "                            | "                 | white or pink changing yellow     |                      | nearly glabrous beneath   | "                  |  |                               |                       |
| notha           | "                          | "                            | "                 | "                                 |                      | glabrous  | acuminate          |  |                               |                       |
| muenden-iensis  | "                          | "                            | "                 | "                                 |                      | pubescent   | acute or obtusish  |  |                               |                       |
| xylost-eum      | "                          | "                            | "                 | white or pale yellow              |                      | broad ovate to obovate densely soft pubescent                         | acute              | elongated, pointed, with long-ciliate pubescent scales |                               | longer than petioles  |
| chrysan-tha     | shrubby tangled, spreading | "                            | "                 | "                                 |                      | rhombic-ovate to ovate-lan-ceolate, pilose                            | acuminate          | "  |                               | "                     |
| morrowi         | "                          | "                            | "                 | "                                 |                      | gray-tomen-tose beneath   | obtusish           | small, gray  | long as the ovary             | "                     |
| ruprecht-lana   | ascending shrubby          | "                            | "                 | "                                 |                      |   |                    | "  | small, glab-rous or glandular |                       |
| maacki          | erect, large shrub         | "                            | "                 | "                                 |                      | moderately large (2-3) pubescent on veins above and below             | tapering both ends | large, brown, glabrous                                 |                               | shorter than petioles |

LONICERA

-- Summer Key

The Genus LONICERA is recognized thus

WINTER : twigs round, slender; leaf scars opposite, crescent-shaped, small, on the tips of the raised bases, with 3 bundle traces and often no stipule scars; buds often superposed, sessile, widely divergent, with numerous 4-ranked scales.

| species           | pith             | buds              | twigs                           | bud size and position               | bud scales                   | habit           | bud tip | bud growth  | lateral buds                                | twig bark                     |
|-------------------|------------------|-------------------|---------------------------------|-------------------------------------|------------------------------|-----------------|---------|---|---|-------------------------------|
| fragrant-issima   | white            |                   | glabrous                        |                                     |                              |                 |         |   |   |                               |
| standishii        | "                |                   | bristly hairy                   |                                     |                              |                 |         |   |   |                               |
| xylost-eum        | brown exca-vated | elongated pointed | very hairy                      | terminal about equal lateral        | gray with long ciliate hairs |                 |         |   |   |                               |
| chrysanth-a       | "                | "                 | a little hairy                  | terminal mostly larger than lateral | "                            |                 |         |   |   |                               |
| maacki            | "                | "                 | very scurfy                     | clustered in twig axils             | glabrous, brown              |                 |         |   |   |                               |
| tatarica          | "                | not elongated     | glabrous                        | slender-ovate pointed               |                              |                 |         |   |   |                               |
| bella             | "                | "                 | "                               | short, globose or oval, obtusish    |                              |                 |         |   |   |                               |
| ruprecht-lana     | "                | "                 | glabrescent or pubescent        |                                     |                              | erect           | acute   |   |   | peeling, scurfy, dark-colored |
| morrowi           | "                | "                 | pubescent                       |                                     |                              | spread-obtusish |         | terminal less developed than lateral                  | very divergent, almost right angled to twig |                               |
| notha             |                  |                   | "                               |                                     |                              |                 |         | lateral about equal to terminal or scarcely developed | less divergent about 60°                    | pubescent                     |
| muenden-lensis    | "                | "                 | "                               |                                     |                              |                 |         |   |   |                               |
| sempervirens      |                  |                   | gray or straw-colored, glabrous |                                     |                              | climbing        |         |   |   | densely woolly                |
| japonica halliana |                  |                   | red-brown, hairy                |                                     |                              | sub-ever-green  |         |   |   |                               |

LONICERA

-- Winter Key



The Genus LYCIUM is recognized thus

SUMMER : leaves alternate, often fascicled, short-petioled, entire; flowers axillary, solitary or clustered, slender-petioled; fruit a red oblong berry.

#### Summer Key

| species      | habit  | twigs                    | leaves                            | fruit  | foliage color | corolla tube                                    |
|--------------|--|--------------------------|-----------------------------------|--------|---------------|---|
| chinense     | scrambling, wide spreading, loosely branched | buff-gray                | rhombic-ovate to ovate-lanceolate | oblong | bright green  | shorter than the limb, rather wide              |
| halimifolium | erect, spreading bushy, with moderate shoots | pale, not hairy in axils | oblong-lanceolate                 | oval   | gray-green    | longer than the limb, narrowed below the middle |

WINTER : scrambling shrubs with slender spinescent twigs; twigs 5-angled, glabrous, often whitish or short striate; leaf scars alternate, crescent-shaped, small, raised, with one bundle trace and no stipule scars; buds small and inconspicuously multiple or dwarf aggregates with few outer scales.

#### Winter Key

| species      | habit   | twigs                                       | branchlets      |
|--------------|---|---|-----------------|
| chinense     | scrambling, wide-spreading, loosely branched  | buff-gray, usually unarmed                  | light yellowish |
| halimifolium | erect, spreading, bushy, with moderate shoots | pale, not hairy in the axils; usually spiny | light gray      |

LYCIUM

The Genus MYRICA is recognized thus

**SUMMER** : leaves alternate, almost entire, resinous-dotted; flowers solitary in the axils of bracts forming catkins; fruit a small, globose, or ovoid drupe coated with resinous grains or wax.  
**\*Myrica asplenifolia** (Comptonia) has leaves that are toothed or pinnatifid, very long and narrow.  
**WINTER** : twigs slender and dotted with resin; pith small, somewhat angled, continuous, green; leaf scars alternate,  $\frac{1}{2}$ -elliptical or a little triangular, somewhat raised, with 3 bundle traces and small or no stipule scars; buds small, solitary, sessile, subglobose or ovoid, with one or two pairs of exposed scales; end-bud lacking.

Summer and Winter Keys combined

| species       | leaves                                | fruit                                  | habit                           | leaf tip | leaf             | leaf form                                     | leaf size                   | twigs |
|---------------|---------------------------------------|--|---------------------------------|----------|------------------|---|-----------------------------|-------|
| *asplenifolia | elongated, narrow & notched, fernlike | bur-like                               |                                 |          |                  |   |                             |       |
| cerifera      | short, entire or with few notches     | globular covered with wax              | tall shrub or small tree to 40' | acute    | often persistent |   |                             |       |
| carolinensis  | "                                     | "                                      | low shrub                       | obtuse   | "                | oblanceolate to obovate                       | fairly large (2-4")         | gray  |
| gale          | "                                     | conellike catkins enclosed by 2 bracts | "                               | "        | deciduous        | oblanceolate to obovate, serrate near the tip | small (1-1 $\frac{1}{2}$ ") | ---   |

\*given elsewhere as *Comptonia asplenifolia*  
 N.B. twigs, fruit and habit are sufficient winter identification.

NEMOPANTHUS MUCRONATUS is recognized thus

**SUMMER** : leaves alternate, simple, elliptic to oblong, mucronate, entire or slightly toothed, grayed beneath, slender petioled; flowers small, whitish, axillary, on slender peduncles, polygamodioecious; fruit a drupe, dull red, subglobose, glabrous, with 4-5 bony nutlets and without sepals at the base, long-stalked.  
**WINTER** : shrub, slender-branched and glabrous; twigs often short, more or less glaucous, with the bark finely fissured in age; leaf scars alternate, clustered at the ends, slightly raised, triangular, with one bundle trace and no stipule scars; buds smallish, ovoid, sessile, solitary, with the tip attenuate, and with 2-3 ciliate outer scales.

MYRICA

NEMOPANTHUS --- MYRICA

The Genus PHILADELPHUS is recognized thus

SUMMER : branches with solid white pith; bark orange, often but not always peeling; leaves opposite, dentate or entire, with 3-5 large veins from the base; flowers white, moderately large, fragrant, terminal on lateral branchlets, with 4 sepals and 4 petals, usually racemose but sometimes solitary or in 2-3 flowered cymes; fruit a 4-valved dehiscent capsule.

# Summer Key

| species      | older bark            | leaves                        | flowers                                     | petals   | styles   | anthers             | pedicels & calyx  | racemes           | habit            | twigs    |
|--------------|-----------------------|-------------------------------|---|--|--|---------------------|---|-------------------|------------------|----------|
| gordonianus  | yellowish, firm       | pubescent both sides, dentate | odorless                                    |  |  |                     | glabrous  |                   |                  |          |
| lewisii      | "                     | glabrous, almost entire       |   |  |  |                     | "   |                   |                  |          |
| virginialis  | brown, peeling freely |                               | double                                      |  |  |                     | densely pubescent   |                   |                  |          |
| var. rosace  | "                     |                               | single, pink                                |  |  |                     | "   |                   |                  |          |
| microphyllus | "                     | thick, entire 1" or less      | solitary or clusters 1-6, not racemes       |  |  |                     | "   |                   |                  |          |
| falconieri   | "                     | larger                        | simple or compound racemes, deeply fragrant | narrow, long, far exceed the stamens, deeply divided |  |                     | glabrous  |                   |                  |          |
| zeyheri      | "                     | "                             | pure white, 5-7, scarcely fragrant          | broad  | divided $\frac{1}{2}$ , longer than stamens, stigmas broad and prominent | white as the petals | "   |                   |                  |          |
| coronarius   | "                     | tapering at base              | cream-white 3-5, very fragrant              | "  | shorter than stamens   | yellow              | more or less villous, lobes of calyx glabrous except edge | rather long loose | erect tall loose | moderate |
| lemoinei     | "                     | "                             | 3-7, very fragrant                          | "  | " stigmas narrow, divided $\frac{1}{2}$                                  | "                   | glabrous or scarcely pubescent                            | short & dense     | low dense twiggy | slender  |
| grandiflorus | "                     | large and thin                | in cymes, 1-3 flowered, not fragrant        | "  | "  |                     | glabrous  |                   |                  | coarse   |

PHILADELPHUS -- Summer Key

The Genus PHILADELPHUS is recognized thus

WINTER : bark orange or brown, usually peeling; twigs more or less lined, angular; pith moderate, rounded, continuous, pale; leaf scars opposite, 2-ranked, with a thin membrane over the bud, becoming crescent-shaped when this bursts, connected by a line around the twig, with 3 bundle traces and no stipule scars; buds solitary, sessile, with one pair of barely overlapping hairy scales; end-bud lacking.

# Winter Key

| species      | older bark            | fruits  | lower pedicels                     | racemes                    | leaf scars | young branchlets   | pedicels & calyx               | buds                  |
|--------------|-----------------------|---------|------------------------------------|----------------------------|------------|--------------------|--------------------------------|-----------------------|
| Gordonianus  | yellowish, firm       | racemes |                                    |                            |            | slightly pubescent | glabrous                       |                       |
| lewisii      | "                     | "       |                                    |                            |            | glabrous           | "                              |                       |
| falconieri   | brown, freely peeling | "       | long, often articulate or branched | 3-5 fruited loose & open   |            | "                  |                                |                       |
| zeyheri      | "                     | "       | short                              | "                          |            | "                  |                                |                       |
| *lemoinei    | "                     | "       | "                                  | 3-7 fruited, short & dense | narrow     | slender            | glabrous or scarcely pubescent | 4 covered by membrane |
| coronarius   | "                     | "       | "                                  | 5-7 fruited, longer        | broad      | moderate           | more or less villous           |                       |
| virginalis   | "                     | "       | medium                             | 3-7 fruited                |            |                    | densely pubescent              |                       |
| grandiflorus | "                     | cymose  |                                    | 1-3 fruited                |            |                    | glabrous                       |                       |

N.B. Winter identification is difficult and not fully decisive.

\*There are a number of Lemoine hybrids, for the most part similar in effect to Lemoinei, except P. rosace which has pink or pinkish flowers in spring.

PHOTINIA VILLOSA is recognized thus

SUMMER : a tall unarmed shrub or small tree; leaves alternate, simple, pinnately veined, finely serrate, stipulate, short-stalked, obovate to oblong-obovate, acuminate, cuneate, glabrous above and villous beneath; flowers white, in corymbs or cymes; fruit a small pome with 4 seeds, open at the top.

WINTER : twigs brown, odorless, moderate, with large lenticels, not spiny but with many short spur-like twigs; leaf scars alternate, 2-ranked, linear-crescent-shaped and very slightly 3-lobed, raised, with 3 bundle traces and no stipule scars; buds solitary, sessile, ovoid, acute, with about 4 slightly keeled and mucronate scales, often slightly red in midwinter.

*PTELEA TRIFOLIATA* is recognized thus

- SUMMER : leaves alternate, petiolate, palmately compound with 3 leaflets; leaflets subsessile, ovate to elliptic-oblong, entire or obscurely cuneate; flowers small, greenish, in corymbs; fruit suborbicular, a samara, the seed encircled by the wing, in large clusters.
- WINTER : a sparse shrub, unarmed; twigs brownish, moderate, terete, warty and dotted, with a rather large whitish pith; leaf scars alternate, raised, rather large, horseshoe-shaped after the membrane is broken by the growing buds, with 3 bundle traces and no stipule scars; buds concealed under a membrane, small, closely superposed in pairs, low-conical, sessile, silvery-silky; end-bud lacking.

*PHYSOCARPUS OPULIFOLIUS* is recognized thus

- SUMMER : leaves alternate, simple, broad-ovate, 3-5 lobed, toothed, estipular, glabrous; flowers white, in many-flowered corymbs, with an unpleasant odor; fruit a small capsule, with the follicles inflated and dehiscent along both sutures, glabrous.
- WINTER : loosely branched shrub with shredding and peeling brown bark, under bark orange; twigs terete, 5-lined from the nodes, moderate, with largish, brownish pith; leaf scars alternate, half elliptical or slightly 3-lobed, raised on a cushion with 5 unequal bundle traces, the lowest one largest, and with small stipule scars on the leaf cushion; fruit often persistent.

*QUERCUS PRINOIDES* is recognized thus

- SUMMER : Habit shrubby, spreading; branchlets soon glabrous; leaves short-petioled, pinnately veined, simple ovate-oblong to oblong, acute, cuneate, undulate-dentate with 3-7 pairs small teeth, glabrous above, grayish tomentulose beneath; flowers in catkins; fruit an acorn, sessile, ovoid, enclosed  $\frac{2}{3}$  by the cup, the cup scales tuberculate.
- WINTER : twigs moderate, fluted; pith star-shaped in section; buds solitary or collaterally multiple, sessile, globose, ovoid or conical, with numerous 5-ranked scales; leaf scars alternate, rather small,  $\frac{2}{3}$ -round, slightly elevated, with 10-12 scattered bundle traces and small stipule scars.

*PTELEA*    --    *PHYSOCARPUS*    --    *QUERCUS*

The Genus RHAMNUS is recognized thus

SUMMER : twigs often spiny-tipped; leaves alternate or opposite, with one main vein, serrulate to entire, with stipules; flowers small, greenish, inconspicuous, in axillary clusters; fruit a globose or subglobose drupe.

WINTER : twigs slender, terete with a moderate, white, continuous pith; leaf scars in broken pairs or alternate, crescent-shaped or  $\frac{1}{2}$ -elliptical, small, raised, with 3 bundle traces and minute stipule scars; buds moderate, solitary, sessile, naked or with several scales; twigs often ending in a thorn about the same length as the buds.

#### Summer Key

| species     | spines                                 | arrangement           | buds        | twigs           | fruiting pedicels                       | winter buds     | fruit      |
|-------------|--|-----------------------|-------------|-----------------|---|-----------------|------------|
| cathartica  | present, scarcely longer than the buds | opposite or nearly so | scaly       | slender         |   |                 |            |
| davurica    | "                                      | "                     | "           | stout, glabrous |   |                 |            |
| frangula    | unarmed                                | alternate             | naked short | pubescent       | glabrous, separate or in sessile umbels |                 | globose    |
| caroliniana | "                                      | "                     | "           | puberulous      | several in a cluster, pubescent         | hoary tomentose | "          |
| purshiana   | "                                      | "                     | long        | pubescent       | "                                       |                 | turbin-ate |

#### Winter Key

| species     | arrangement           | branchlets         | buds  | margin of leaves               | fruit                              | leaves   | under side of leaves                           |
|-------------|-----------------------|--------------------|-------|--------------------------------|------------------------------------|--|--|
| cathartica  | opposite or nearly so | usually spinescent | scaly | serrate, teeth short or obtuse | short                              | large, dull, (11-41) thin, broad-ovate to elliptic | light green, with 2-3 pairs of ascending veins |
| davurica    | "                     | "                  | "     | "                              | "                                  | lustrous, firm, narrow elliptic to oblong          | curving, veins gray-green                      |
| frangula    | alternate             | unarmed            | naked | usually entire                 |                                    | lustrous, oval to obovate, acute                   | with 8-9 pairs of veins                        |
| caroliniana | "                     | "                  | "     | nearly entire                  | peduncles shorter than the petiole | thickish, acute                                    | 8-10 pairs of veins                            |
| purshiana   | "                     | "                  | "     | "                              | longer than the petiole            | "  | 8-15 pairs of veins                            |

RHAMNUS



# RHODOTYPOS KERRIOIDES (syn. *R. scandens*) is recognized thus

SUMMER : leaves opposite, simple, ovate to ovate-oblong, acuminate, base rounded, sharply doubly serrate; flowers white, large, with 4 suborbicular petals and 4 serrate sepals; fruit a dry drupe, shiny brownish-black, obliquely ellipsoid, in clusters of four set above the persistent sepals.

WINTER : a loosely branched shrub; twigs moderate, glabrous, red-brown, somewhat lenticular; leaf scars opposite, crescent-shaped, moderate sized, ciliate at the top and connected by a ciliate line, with 3 bundle traces and no stipule scars; buds moderate, becoming collaterally multiple and at length very slightly stalked, ovoid, glabrous, with about 6 pairs of scales.

The Genus *RHUS* may be recognized thus

SUMMER : leaves alternate, pinnately compound, three to many-parted or simple, aromatic when crushed; flowers small, in terminal or axillary panicles; fruit a globose or compressed drupe, hairy or resinous, in compact clusters; twigs usually coarse.

## Summer Key

| species   | nature        | fruits           | habit                | leaves       | inflorescence | leaf margin                 | leaf rachis | leaf surface               | twigs              |
|-----------|---------------|------------------|----------------------|--------------|---------------|-----------------------------|-------------|----------------------------|--------------------|
| radicans  | poisonous     | glabrous whitish | trailing or climbing | three-parted | axillary      |                             |             | glabrous                   |                    |
| vernix    | "             | "                | erect                | many-parted  | "             |                             |             | "                          |                    |
| aromatica | non-poisonous | red, hairy       | "                    | three-parted | "             |                             |             | pubescent                  |                    |
| copallina | "             | "                | "                    | many-parted  | terminal      | entire or obscurely serrate | winged      | glabrous, glossy           |                    |
| javanica  | "             | "                | "                    | "            | "             | coarsely serrate            | "           | brown-hairy beneath        |                    |
| glabra    | "             | "                | "                    | "            | "             | "                           | not winged  | glabrous, glaucous beneath | glabrous glaucous  |
| typhina   | "             | "                | "                    | "            | "             | "                           | "           | "                          | densely hairy      |
| cotinus   | "             | black            | "                    | simple       | "             | entire                      |             | glabrous                   | glabrous, glaucous |

RHODOTYPOS

-- RHUS

Summer Key

The Genus RHUS is recognized thus

WINTER : twigs round or bluntly 3-sided, sometimes fluted, slender to very stout, pungently aromatic when cut or bruised, either very hairy or with prominent lenticels or smooth; leaf scars alternate, round or crescent-shaped or C-shaped and encircling the buds, more or less raised, with numerous bundle traces sometimes collected in groups and without stipule scars; buds moderate or rather small, solitary, sessile, round-ovoid, hairy and indistinctly scaly or with 3-4 evident scales; end-bud often lacking.

# Winter Key

| species   | habit   | fruits                               | sap                 | leaf scars                     | twigs          | lenticels                         | twig color     |
|-----------|---|--------------------------------------|---------------------|--------------------------------|----------------|-----------------------------------|----------------|
| radicans  | poisonous, trailing or climbing by aerial roots | glabrous, whitish                    |                     |                                |                |                                   |                |
| vernix    | poisonous, erect shrubby                        | "                                    |                     |                                |                |                                   |                |
| aromatica | non-poisonous, erect, shrubby                   | axillary red-hairy                   | offensively pungent | elevated, round, covering buds |                |                                   |                |
| cotinus   | "   | terminal, black, in plumose clusters | summy aromatic      | elevated                       |                |                                   |                |
| copallina | "   | terminal, red-hairy nodding          | "                   | not elevated, U-shaped         | not hairy      | numerous, prominent, almost warty | orange-yellow  |
| javanica  | "   | terminal, erect                      | "                   | not elevated, C-shaped         | sparsely hairy | prominent                         | dark           |
| typhina   | "   | "                                    | "                   | "                              | densely hairy  | concealed by hairs                | brown to black |
| glabra    | "   | terminal curved                      | "                   | "                              | not hairy      | visible, not prominent            | red, glaucous  |

RHUS -- Winter Key

The Genus RIBES may be recognized thus

**SUMMER** : unarmed or prickly shrubs; leaves 1-2" broad, alternate, petioled, simple, with 3-7 notched lobes, palmately veined, stipulate; flowers perfect or dioecious, 5-merous, in few to many flowered racemes, rarely clustered or solitary; fruit a small, sour, juicy, many-seeded berry crowned by the remains of the calyx.

**WINTER** : stems prickly or unarmed; twigs rounded, moderate in size, with decurrent ridges below the nodes; buds small, ovoid, solitary, sessile or becoming short-stalked, with about 6 loose scales; leaf scars alternate, linear or U-shaped or broadly crescent-shaped, slightly raised, with 3 bundle traces and no stipule scars.

#### Summer Key

| species    | habit             | flower clusters   | flowers              | floral color       | under side of leaves | young branchlets                                | leaf form           | sepals                             |
|------------|-------------------|-------------------|----------------------|--------------------|----------------------|---|---------------------|------------------------------------|
| alpinum    | low, dense twiggy | erect racemes     | short, inconspicuous |                    |                      |   |                     |                                    |
| sanguineum | loose, open       | pendulous racemes | showy                | red, pink or white | white tomentose      | pubescent, often sparingly glandular & aromatic |                     |                                    |
| odoratum   | "                 | "                 | "                    | yellow             | glabrous             | pubescent                                       | ovate to roundish   | less than the length of calyx tube |
| aureum     | "                 | "                 | "                    | "                  | "                    | glabrous or puberulous                          | roundish to obovate | more than as long as calyx tube    |

N.B. The gooseberries have spines at the nodes and prickly fruits and more narrow leaf scars, while the currants are unarmed or seldom prickly

#### Winter Key

| species    | habit             | leaf scars | leaves in bud | branchlets  | buds        |
|------------|-------------------|------------|---------------|---|-------------|
| alpinum    | low, dense twiggy | narrow     |               | nearly glabrous, buff                             | stalked     |
| sanguineum | loose, open       | broad      | plaited       | pubescent, often sparingly glandular and aromatic | "           |
| odoratum   | "                 | "          | convolute     | pubescent   | "           |
| aureum     | "                 | broad      | "             | glabrous or puberulous                            | not stalked |

RIBES

# The Genus ROSA is distinguished thus

SUMMER : twigs thorny, rarely unarmed; leaves alternate, pinnately compound, stipulate; flowers terminal, solitary or in corymbs, floral parts in 5's, pistils numerous, enclosed in an urn-shaped hip which becomes fleshy and berrylike enclosing several - to many-bony achenes.

WINTER : mostly shrubs, occasionally trailing or scrambling; branches moderate, terete, armed with prickles, often hooked prickles; leaf scars low, broadly crescent-shaped or almost linear, with 3 bundle traces and no stipule scars.

## Summer and Winter Keys combined

| species    | habit                                     | number of leaflets   | stems       | leaflets                                  | flowers                        | branchlets & prickles                  | prickles                             | branches                             | akenes                | stipules                       | fruit                   |
|------------|---|----------------------|-------------|---|--------------------------------|--|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| wichuriana | prostrate, evergreen                      | nine                 |             | lustrous, glabrous obtuse, broad          |                                |  |                                      |                                      |                       |                                |                         |
| multiflora | high climbing, deciduous                  | seven                |             | pubescent, obovate to oblong              | small, white in large clusters |  |                                      |                                      |                       |                                | small in large clusters |
| setigera   | deciduous, upright, with arching branches | 3, rarely 5          |             | ovate, oblong, pubescent on veins beneath | large pink                     |  | recurved                             | red                                  |                       |                                |                         |
| blanda     | erect, bushy                              |                      |             |   |                                |  |                                      | unarmed except suckers               |                       |                                |                         |
| rugosa     | "   |                      | very thorny | rugose                                    |                                | tomentose                              | needle-like nearly straight          | with prickles                        |                       |                                |                         |
| acicularis | "   | 3-7 oblong           |             | not rugose                                |                                | glabrous                               | "                                    | prickly also on flowering branchlets |                       | flat                           |                         |
| nitida     | "   | 7-11 elliptic        |             | "   |                                | glandular hispid                       | "                                    | "                                    |                       | "                              |                         |
| carolina   | "   | 5, rarely 7 elliptic | red         | dull above                                |                                |  | flattened at base or strongly hooked |                                      | only in bottom of hip |                                |                         |
| canina     | "   | 5-7 oval             | green       | singly serrate                            |                                | thorns much dilated                    | "                                    |                                      |                       |                                |                         |
| rubiginosa | "   | 5-7 broadly oval     | "           | doubly serrate, glandular, fragrant       |                                | thorns not dilated                     | "                                    |                                      |                       |                                |                         |
| spinossima | "   | usually 9            |             | very small, base rounded to pink          | white                          | flowering branchlets prickly & bristly | of 2 kinds                           |                                      |                       | narrow with divergent auricles | black                   |
| hugonis    | "   | 5-13                 | red-brown   | small, oval, cupate villous               | yellow single                  | flowering branchlets not bristly       | "                                    | bristly at least base never bristly  |                       | "                              | red                     |
| zanthina   | "   | 7-13                 | "           | broad-oval                                | double yellow                  | "                                      | "                                    |                                      |                       | "                              | "                       |

ROSA

The Genus RUBUS may be recognized thus

SUMMER : stems prickly and short-lived; leaves alternate, 3-parted or pinnately compound and with stipules; flowers showy, white to pink, in racemes or panicles or corymbs or solitary, usually terminal; floral parts in fives; fruit an aggregate of drupelets.

Summer Key :

| species                | habit                 | leaves   | fruit surface    | flowers  | stems                                       | fruit                             | prickles                |
|------------------------|-----------------------|--|------------------|--|---|-----------------------------------|-------------------------|
| odoratus               | erect, unarmed        | simple   |                  |  |   |                                   |                         |
| spectabilis            | erect armed           | compound   | orange           | solitary, large noddling, large                          | glabrous, with numerous fine prickles below | hollow, separating from the torus |                         |
| occidentalis           | "                     | "  | black, bloomy    | moderate, in many-flowered corymbs                       | very glaucous purplish                      | "                                 | short                   |
| idaeus, var. strigosus | "                     | "  | red, tomentulose | moderate, in racemes, petals erect                       | finely tomentose                            | "                                 | few, broad              |
| alleggheniensis        | "                     | "  | black bloomy     | in densely glandular-hispid racemes                      | glandular pubescent                         | not hollow, retaining the torus   | stout, straight         |
| caesius                | creeping or prostrate | compound, with narrow stipules attached to petiole | "                | in corymbs, few-flowered, pubescent, glandular & prickly | glaucous, terete, slightly puberulous       | of a few large drupelets          | weak, sparse, scattered |
| procumbens             | "                     | compound   | "                | "  | sub-terete, glabrous                        | "                                 | stout, recurved         |

N.B. This groups of Rubus does not develop flowers on first-year wood.

RUBUS

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Summer Key



The Genus RUBUS is identified thus

WINTER : twigs short-lived, soft-wooded, armed with prickles, moderate, often 5-angled, leaf scars alternate, torn and irregularly shriveled, on a much-raised and persistent petiole base, with the bundle traces completely indistinct and no stipule scars.

# Winter Key

| species         | habit       | bark      | stems                   | prickles                    | canes              |
|-----------------|-------------|-----------|-------------------------|-----------------------------|--------------------|
| odoratus        | erect       | shredding | villous                 |                             |                    |
| idaeus *        | unarmed     | not       | and glandular           |                             |                    |
| spectabilis     | "           | shredding | finely tomentose,       | more straight, numerous,    | at most very       |
|                 | erect,      | "         | straw-colored           | bristly-like                | stoloniferous      |
|                 | armed       |           | glabrous, with numerous | fine                        |                    |
| occidentalis    |             |           | fine prickles below     |                             |                    |
|                 | "           | "         | very glaucous,          | short, stout, and           | recurving,         |
| alleggheniensis | "           | "         | purplish                | persistent, strongly hooked | rooting at the tip |
|                 | "           | "         | stellate-pubescent      | more straight, especially   | at most very       |
| caesius         | creeping or | "         | near the apex, grooved, | on stems, persistent        | stoloniferous      |
|                 | prostrate   |           | glaucous, terete,       | weak, sparse,               |                    |
|                 | "           | "         | slightly puberulous     | scattered                   |                    |
| procumbens      | "           | "         | sub-terete,             | stout, slender              |                    |
|                 |             |           | glabrous                | straightish                 |                    |

\*consider strigosus as a variety of idaeus



The Genus SALIX is recognized thus

SUMMER : TWIGS very flexible; leaves alternate, petiolate or sessile, mostly lanceolate, toothed or entire, often stipulate; flowers in catkins with or before the leaves; fruit a 2-valved capsule.  
WINTER : Bark smooth, wood soft, twigs very flexible; leaf scars alternate, low, U-shaped, with 3 bundle traces and short, if any, stipule scars; buds oblong, appressed, sessile, solitary, with one cap-like scale which splits on the inside next the twig.

Summer and Winter Keys combined

| species   | mature leaves                        | underside of leaves            | buds                          | habit                       | branchlets                 | leaf form  | leaf margin                    | leaf tip                    | fruits                                  |
|-----------|--------------------------------------|--------------------------------|-------------------------------|-----------------------------|----------------------------|--|--------------------------------|-----------------------------|---|
| caprea    | glabrous                             | glaucous or glaucous           | stout & reddish               | tree or shrub               | young branchlets pubescent | elliptic   | serrate                        | acute or abruptly acuminate |   |
| discolor  | "                                    | "                              | more slender and nearly black | shrub                       | young branchlets tomentose | generally oblong   | "                              | more or less acuminate      |   |
| irrorata  | "                                    | "                              | white-villous                 |                             | bloomy                     | lanceolate to linear-lanceolate                              | obscurely serrulate sub-entire |                             |   |
| lucida    | "                                    | Green                          | moderately large              |                             | lustrous, yellow-brown     | ovate-lanceolate to oblong lanceolate with glandular petiole | glandular serrate              | very long-acuminate         | dull straw-color bottle-necked          |
| pentandra | "                                    | "                              | "                             |                             | polished green or chestnut | broadly ovate to oblong-lanceolate with a glandular petiole  | "                              | shortly acuminate           | lustrous straw-color tapering gradually |
| incana    | villous with loosely appressed hairs | densely pubescent or tomentose | moderate orange-red           | a large shrub to 20' or 40' | orange-red villous         | linear   | serrulate near apex, revolute  |                             |   |
| humilis   | "                                    | glaucous and soft pubescent    | small to 3 mm.                | a shrub 3' to 9'            | pubescent or tomentose     | oblanceolate to oblong-lanceolate                            | entire or subentire            |                             |   |
| tristis   | "                                    | glabrescent                    | small to 2 mm.                | a shrub to 18"              | glabrescent                | narrowly oblanceolate to linear lanceolate                   |                                |                             |   |

Also see Salix among the trees

SALIX

The Genus *SAMBUCUS* may be recognized thus

**SUMMER** : open shrubs with coarse, angled twigs; pith large and soft, continuous; leaves opposite, pinnately compound; leaflets serrate; flowers small, in terminal compound corymbs or panicles; floral parts in 5's; corolla rotate; fruit a berry-like drupe with 3-5 nutlets.

**WINTER** : branches stout; pith large and soft, continuous; leaf scars opposite or whorled, broadly crescent-shaped or triangular or rhomboid, large, low, more or less connected around the twig, with 3-5-7 bundle traces and no stipule scars; buds solitary or multiple, the larger ones stalked, ovoid, or depressed with 3-5 pairs of scales; end-bud usually lacking.

#### Summer Key

| species           | fruit | flowers                  | twigs          | foliage color | under side of leaves  | leaflets  | odor                      |
|-------------------|-------|--------------------------|----------------|---------------|-----------------------|-----------|---------------------------|
| <i>racemosa</i>   | red   | convex cymes or panicles | often 4-angled |               |                       |           |                           |
| <i>canadensis</i> | black | flat cymes               | terete         | bright green  | glabrous              | usually 7 | slight                    |
| <i>nigra</i>      | black | "                        | "              | dark green    | pubescent while young | usually 5 | disagreeable when bruised |

#### Winter Key

| species           | pith  | branches    | lenticels              | odor                                 |
|-------------------|-------|-------------|------------------------|--------------------------------------|
| <i>racemosa</i>   | brown | light brown |                        |                                      |
| <i>canadensis</i> | white | yellow gray | moderate               | slight                               |
| <i>nigra</i>      | white | gray        | numerous and prominent | strong and disagreeable when crushed |

*SAMBUCUS*

The Genus SORBARIA is recognized thus

SUMMER : leaves alternate, pinnately compound, thin, sharply serrate, stipulate; leaflets lance-oblong; flowers white, in large terminal panicles, floral parts in fives; fruits tan-colored, dehiscent capsules.

WINTER : low shrubs, not twiggy nor much branched; twigs rather stout for the size of the plant, glabrous and terete; pith rather large, brown, continuous; leaf scars alternate, relatively large, rounded or irregular in form, scarcely raised, with 3 bundle traces and no stipule scars.

# Summer and Winter Keys combined

| species           | twigs and buds | habit              | flowers                       | fruits               | leaf margin    |
|-------------------|----------------|--------------------|-------------------------------|----------------------|----------------|
| <i>lindleyana</i> | red-brown      | shrub to 8'        | in mid-summer, clusters 8-12" | on recurved pedicels | doubly serrate |
| <i>sorbifolia</i> | gray-brown     | shrub to 5'        | late spring, clusters 5-12"   | upright              | "              |
| <i>aitchisoni</i> | red to purple  | shrub to 7' or 10' | late summer, clusters 8-12"   | "                    | singly serrate |

SORBARIA

The Genus SPIREA may be recognized in

SUMMER :leaves alternate, simple, dentate or serrate or sometimes lobed, rarely entire, with short petioles and no stipules, pinnately veined; flowers small in umbel-like racemes, corymbs or panicles, floral parts in fives; fruits tan-colored capsules, dehiscent at the top.

# Summer Key

| species       | flowers                                  | leaf margin                   | leaves                              | floral color  | inflorescence                       |
|---------------|--|-------------------------------|-------------------------------------|---------------|-------------------------------------|
| van houttei   | umbels, with the leaves, on new shoots   | incisely serrate, often lobed | glabrous, apex acute                | white         |                                     |
| hypericifolia | umbels before leaves, entire on old wood |                               |                                     | "             |                                     |
| thunbergi     | "  | serrate or dentate            | linear-lanceolate, glabrous         | "             | 3-5 flowered, sessile               |
| arguta        | "  | "                             | oblong, finely pubescent when young | "             | many-flowered, lower umbels stalked |
| prunifolia    | "  | denticulate                   | oblong, pubescent beneath           | "             | umbels all sessile, 3-6 flowered    |
| *bumalda      | corymbs at tips of branches              |                               |                                     | pink or white | flat-topped corymbs                 |
| tomentosa     | panicles                                 | unequally serrate             | tawny beneath, ovate                | pink          | brownish tomentose                  |
| billiardii    | "  | sharply doubly serrate        | pubescent, oblong                   |               | tomentulose                         |
| salicifolia   | "  | sharply serrate               | glabrous, lanceolate                | "             | "                                   |
| alba          | "  | often doubly serrate          | glabrous, elliptic                  | white         | tomentose                           |
| latifolia     | "  | sharply serrate               | glabrous, oblanceolate              | "             | glabrous                            |

\*bumalda var. antony waterer is a better color than the type.



The Genus SPIREA is recognized thus

WINTER : shrubs, low and little branched or with slender, arching, wand-like branches; twigs terete or angled from the nodes, more or less zigzag; with small, rounded, continuous; buds small, usually solitary or occasionally collaterally multiple, sessile, globose or spindle-shaped, with about 6 outer scales; leaf scars alternate, 1/2-round or crescent shaped, minute, often much raised, with one bundle trace and no stipule scars.

# Winter Key

| species       | buds                               | twigs               | branchlets and buds       | lateral twigs                     | bud arrangement                   | bark color               | pubescence    | vestiges of inflorescence              |
|---------------|------------------------------------|---------------------|---------------------------|-----------------------------------|-----------------------------------|--------------------------|---------------|--|
| van houttei   | conical, with several outer scales | slender terete      | glabrous                  |                                   |                                   |                          |               |  |
| hypericifolia | ovoid                              | sub-terete          | pubescent                 |                                   |                                   |                          |               |  |
| prunifolia    | "                                  | more or less angled | "                         | fine, zigzag                      | often collaterally multiple       | gray                     |               |  |
| arguta        | "                                  | "                   | puberulous or glabrescent | filiform or numerous              | "                                 | red-brown                | gray or dingy |  |
| thunbergi     | "                                  | "                   | "                         | "                                 | solitary                          | yellow-brown             | "             |  |
| bumalda       | "                                  | "                   | not glaucous              | neither very slender nor numerous | solitary or collaterally multiple |                          | "             | persistent corymbs at tips of branches |
| tomentosa     | "                                  | "                   | brown tomentose           | "                                 | "                                 |                          | "             | persistent panicles, brown-tomentose   |
| billiardii    | "                                  | "                   | pubescent                 | "                                 | "                                 | gray-brown               | "             | paniculate dingy-tomentulose           |
| salicifolia   | "                                  | "                   | puberulous                | "                                 | "                                 | yellow-brown             | "             | panicles pubescent                     |
| alba          | "                                  | "                   | "                         | "                                 | "                                 | red-brown                | scanty        | panicles dingy tomentulose             |
| latifolia     | "                                  | "                   | glabrous                  | "                                 | "                                 | bright or dark red-brown | none          | paniculate, glabrous                   |

**STAPHYLEA TRIFOLIA** is recognized thus

**SUMMER** : leaves opposite, pinnately compound with 3 leaflets, stipulate and stipellate, lateral leaflets sessile, unequally serrulate, elliptic to ovate; the stipules deciduous; flowers regular, in terminal panicles, sepals and petals of equal length, greenish-white or slightly pinkish, inconspicuous; fruit an inflated, membranous capsule, 3-lobed, dehiscent, with several shiny, bony seeds.

**WINTER** : twigs with smooth, striped bark, moderate, terete, glabrous, with a rather large pith; leaf scars opposite,  $\frac{1}{2}$ -round, slightly raised, with 3-7 bundle traces which are compound, and the stipule scars  $\frac{1}{2}$ -round or elongated; buds ovoid, with 2-4 scales, solitary, sessile, glabrous; the end-bud usually lacking.

**STEPHANANDRA FLEXUOSA** (syn. incisa) is recognized thus

**SUMMER** : leaves alternate, 2-ranked, serrate and deeply lobed, ovate, long acuminate, broadly cordate, pubescent on the veins beneath, stipulate; flowers small, greenish-white, in loose terminal panicles, the bracts awl-like and shorter than the slender peduncles.

**WINTER** : branches slender, zigzag, nearly round or slightly 5-lined from the nodes, red-brown; leaf scars alternate, 2-ranked, small,  $\frac{1}{2}$ -round or triangular, a little raised, with 3 bundle traces and rather large stipule scars; buds superposed, small, ovoid or oblong, with about 4 outer scales.

The Genus **SYMPHORICARPUS** is recognized thus

**SUMMER** : leaves opposite, short-petioled, entire or occasionally lobed on vigorous shoots, and without stipules; flowers small, axillary, usually forming clusters or terminal spikes; fruit a 2-seeded berry.

**WINTER** : deciduous shrubs with slender, arching branches, more or less pubescent; pith small, brownish, usually excavated; buds small, solitary or collaterally multiple or developing lateral branches the first season, ovoid-oblong, more or less compressed, sessile, with about 3 pairs of keeled scales; leaf scars opposite,  $\frac{1}{2}$ -round, small, ragged or torn, raised, partly connected by transverse ridges, with one indistinct bundle trace and no stipule scars.

Summer and Winter Keys combined

| species  | inflorescence     | fruit | pith       | corolla          | young branchlets |
|----------|-------------------|-------|------------|------------------|------------------|
| racemosa | terminal racemes  | white | excavated  | pubescent inside | glabrous         |
| vulgaris | axillary clusters | red   | continuous | glabrous inside  | pubescent        |



The Genus SYRINGA is distinguished thus

**SUMMER** : shrubs or small trees with opposite, petiolate leaves having the margins entire; flowers and fruits in terminal or lateral panicles on wood of the previous season; calyx and corolla with four parts, corolla saucer-shaped with a tube and four valvate lobes; stamens two; fruit an oblong capsule splitting in two parts.

**WINTER** : deciduous shrubs or small trees; twigs moderate or slender; pith moderate, homogeneous, round, pale in tone; buds usually solitary, sessile, ovoid, with about four pairs of exposed scales, end-bud frequently absent and the branches forked; leaf scars opposite, crescent or shield-shaped, raised, rather small, with one compound bundle-trace and no stipule scars.

Winter identification of species is uncertain and incomplete at present.

( see tabular key to species on following page )

**SYRINGA**

| species     | flowers                                       | habit                       | inflor-escence                       | corolla lobes                             | panicles       | underside of leaves                 | corolla tube                                | branchlets                               | anthers                       | leaves                     | flower clusters |
|-------------|---|-----------------------------|--------------------------------------|---|----------------|-------------------------------------|---|--|-------------------------------|----------------------------|-----------------|
| pekinensis  | cream-white, corolla-tube short               | large shrub                 |                                      |   |                |                                     | little longer than calyx                    |  |                               | cuneate                    |                 |
| amurensis   | "   | "                           |                                      |   |                |                                     | base rounded                                |  |                               | base rounded               |                 |
| japonica    | "   | small tree bark cherry-like |                                      |   |                |                                     | "   |  |                               | subcordate                 |                 |
| emodi       | not yellowish, corolla-tube longer than calyx | shrub, with simple leaves   | terminal, leafy at base              | reflexed, at stamens protruding           |                | papillose                           | much longer than calyx                      |  |                               |                            |                 |
| reflexa     | "   | "                           | "                                    | erect or spreading stamens not protruding | pendulous      | not papillose                       | "   |  |                               |                            |                 |
| yunnanensis | "   | "                           | "                                    | "   | not pendulous  | not papillose                       | "   |  |                               |                            |                 |
| josi-kaca   | "   | "                           | "                                    | "   | "              | not papillose, glaucous, color dark | longer than calyx, widened above the middle | pubescent                                | deep-seated                   | oblong, large              | capsule acute   |
| wolfi       | "   | "                           | "                                    | "   | "              | "                                   | "   | glabrous                                 | "                             |                            |                 |
| sweginowii  | "   | "                           | "                                    | "   |                |                                     |   |  | near mouth of tube            | base rounded, ovate        |                 |
| villosa     | "   | "                           | "                                    | "   | pale pinkish   |                                     |   |  | "                             | oblong, cuneate            | capsule obtuse  |
| persica     | "   | "                           | lateral, terminal bud usually absent |   |                |                                     |   |  |                               | lanceolate, base cuneate   |                 |
| chinensis   | "   | "                           | "                                    | "   |                |                                     |   |  |                               | narrow-ovate cuneate       |                 |
| vulgaris    | "   | "                           | "                                    | "   |                |                                     |   | leaf scars medium, inconspicuous         | near the mouth of the tube or | ovate, truncate            |                 |
| oblata      | "   | "                           | "                                    | "   | colortone pale |                                     |   | glabrous, leaf scars large & conspicuous | deepset                       | broad-ovate, tinged maroon |                 |
| meyeri      | "   | "                           | "                                    | "   | colortone dark |                                     | long, very slender                          | pubescent, slightly square               |                               | ovate cordate              |                 |
| palibiniana | "   | "                           | "                                    | "   |                | glabrate                            | shorter than                                | purplish, glabrous                       |                               | "                          | long & slender  |
| microphylla | "   | "                           | "                                    | "   |                | pubescent                           | "   | slightly pillose                         |                               | "                          | short & dense   |
| pinnatifida | "   | shrub, leaves compound      | "                                    | "   |                | glabrous                            |   |  |                               |                            |                 |

The Genus TAMARIX is distinguished thus

SUMMER : a very fine-textured shrub or tree; branches very slender, terete, the ultimate small branchlets falling with the leaves; leaves small, almost scale-like, often sheathing; flowers small, short-pedicelled or sessile in dense racemes collected in terminal panicles; fruit a dehiscent capsule with many minute seeds and with a tuft of hairs at the apex.

WINTER : shrubs or small trees with slender branches; pith small, not central; twig lacking leaf scars, bundle traces or stipule scars; the dilated base of the alternate leaves persisting; buds small, sessile, rounded, appressed, solitary or concentrically multiple, with about 3 scales.

#### Summer Key

| species    | flowers  | floral parts | foliage                      | petals     | branches            | disk                | blooming season |
|------------|--|--------------|------------------------------|------------|---------------------|---------------------|-----------------|
| parviflora | lateral racemes on last year's wood                        | in 4's       | blue-green                   |            | arching             |                     | earliest of all |
| gallica    | terminal panicles on wood of current year, dense and large | in 5's       | bright green or yellow-green | deciduous  | spreading, glabrous | 5-angled or 5-lobed |                 |
| pentandra  | terminal panicles, slender                                 |              | glaucous or pale green       | persistent | glabrous, upright   | 10-lobed            |                 |

#### Winter Key

| species    | habit     | twigs and buds | buds                                    |
|------------|-----------|----------------|---|
| pentandra  | upright   | purple         | glabrous, small                         |
| parviflora | arching   | dark purple    | glabrous, small                         |
| gallica    | spreading | red-brown      | small, globose and very hairy, multiple |



The Genus VACCINIUM is recognized thus

SUMMER : leaves alternate, short-petioled, glabrous or puberulent beneath, entire or serrate, narrow-elliptic to oblong lanceolate or obovate, acute both ends; flowers axillary or terminal, solitary or in racemes, the corolla cylindric and 4-5 lobed; fruit a fleshy, many-seeded berry with persistent calyx lobes, bloomy blue-black.

WINTER : unarmed, odorless shrubs; branchlets slender or very slightly angular, somewhat hairy, brown or greenish tinged red, nearly glabrous and smooth; leaf scars alternate, very small, 1/2-round or crescent-shaped, slightly raised, with one bundle trace and no stipule scars; buds small, ovoid, solitary, sessile, with two or more pointed scales; end-bud usually lacking.

# Summer and Winter Keys combined

| species        | habit         | branchlets                     | buds                  | leaves  | flowers                              | habitat             |
|----------------|---------------|--------------------------------|-----------------------|---|--------------------------------------|---------------------|
| corymbosum     | tall shrub    | angled and warty               | ovoid, scales pointed | glabrous beneath, entire or nearly so                     | cylindric corolla, longer than broad | moist woods or bogs |
| pennsylvanicum | low and dwarf | grooved above buds, puberulous | "                     | glabrous both sides, serrulate with bristle-pointed teeth | short-cylindric, broader than long   | dry, sandy slopes   |

The Genus *VIBURNUM* is recognized thus

SUMMER : shrubs or small trees; Leaves opposite, rarely whorled, entire, dentate, or lobed, usually without stipules; flowers small, white or pinkish, in umbel-like or paniculate compound cymes, floral parts in 5's; fruit a one-seeded drupe with the stone usually compressed.

# Summer Key

| species        | foliage               | branchlets                   | fruit                | leaves  | leaf form       | flower clusters  | petiole                                   | leaf scars                       | winter buds     | leaf color                |
|----------------|-----------------------|------------------------------|----------------------|---|-----------------|--|---|----------------------------------|-----------------|---------------------------|
| americanum     | lobed                 | glabrous                     | red                  | glabrous below  | ---             | ---  | with broad shallow grooves & small glands |                                  |                 |                           |
| opulus         | "                     | "                            | "                    | pubescent below                                       | ---             | ---  | with narrow grooves and large glands      |                                  |                 |                           |
| acerifolium    | "                     | pubescent                    | bluish-black         | densely pubescent below & black dotted                | ---             | ---  |   |                                  |                 |                           |
| rhytidophyllum | not lobed, persistent | stellate-pubescent           | ---                  | sub-evergreen   | ---             | ---  |   |                                  |                 |                           |
| cassinoides    | not lobed deciduous   | glabrous                     | ---                  | remotely denticulate                                  | ---             | peduncles shorter than the cyme                          |   |                                  | soon leaden     |                           |
| lentago        | "                     | "                            |                      | sharply finely serrate                                | ---             | umbel-like, flat, sessile                                | with broad, wavy margin                   |                                  | leaden          |                           |
| prunifolium    | "                     | glabrous, rigid              |                      | "   | ---             | "  | not margined                              |                                  | leaden          | tinged red with red stems |
| rufidulum      | "                     | rigid                        |                      |   |                 |  | margin narrow, not wavy                   |                                  | rusty pubescent |                           |
| molle          | "                     | puberulous with peeling bark | blue-black           | dull, pubescent beneath                               | broadly ovate   |  |   |                                  | with scales     | deep bright green         |
| dentatum       | "                     | glabrous                     | "                    | lustrous  | "               |  |   |                                  | "               | "                         |
| dilatatum      | "                     | pilose                       | red                  | both sides pubescent, with more than 5 pairs of veins | "               |  |   |                                  | "               | "                         |
| sieboldi       | "                     | pubescent                    | red changes to black | glossy, veins impressed                               | oblong elliptic | all flowers fertile, marginal flowers sterile & enlarged |   | broad, meeting relatively narrow | "               | lively bright green       |
| tomentosum     | "                     | stellate tomentose           | "                    |   | "               |  | without stipules                          |                                  | "               | dark green                |
| lantana        | "                     | scurfy pubescent             | "                    | closely denticulate                                   | "               | umbel-like, flat, of small white, fertile flowers        |   |                                  | naked           | dark, dull green          |
| carlesi        | "                     | stellate tomentose           | "                    | coarsely dentate                                      | "               | umbel-like, pinkish, large very fragrant                 |   |                                  |                 | gray-green                |
| burkwoodi      | "                     | puberulous                   | "                    | glabrous & glossy                                     | "               | white, flushed   |   |                                  |                 | dark green                |

The Genus VIBURNUM may be recognized thus

WINTER : twigs moderate, more or less hexagonal, pith continuous, white or brownish; leaf scars opposite, crescent-shaped, raised or meeting or connected, with 3 bundle traces and no stipule scars; buds solitary or rarely superposed, usually stalked, scaly or naked, ovoid or oblong.

# Winter Key

| species        | foliage    | branches      | buds              | bud<br>scales                      | leaf<br>scar      | bud<br>form            | twig                                  | bark    | bud<br>color    | fruit                        |
|----------------|------------|---------------|-------------------|------------------------------------|-------------------|------------------------|---------------------------------------|---------|-----------------|------------------------------|
| rhytidophyllum | persistent |               |                   |                                    |                   |                        |                                       |         |                 |                              |
| lantana        | deciduous  |               | naked             |                                    | narrow            |                        | stout, densely pubescent, scurfy      |         |                 |                              |
| carlesii       | "          |               | "                 |                                    | "                 |                        | more slender, stellate-tomentose      |         |                 |                              |
| molle          | "          |               | scaly             | imbricate                          | "                 |                        | glabrous, gray                        | peeling |                 |                              |
| dentatum       | "          |               | "                 | "                                  | "                 |                        | "                                     | firm    |                 |                              |
| acerifolium    | "          |               | "                 | "                                  | "                 | squared                | pubescent                             | "       |                 |                              |
| prunifolium    | "          | rigid         | "                 | valvate                            | "                 | oblong or flask-shaped | reddish, pubescent, rigidly spreading |         | a little leaden |                              |
| rufidulum      | "          | "             | "                 | "                                  | "                 |                        | rusty-pubescent, stout, rigid         |         | rusty, fired    |                              |
| dilatatum      | "          | more flexible | scaly, hispid     | valvate, outer scales parted short | relatively narrow | sub-ovoid              | stout, very hairy, hispid             |         |                 |                              |
| sieboldii      | "          | "             | scaly, not hispid | closely valvate like a sack        | broad, meeting    |                        | stout, pubescent                      |         |                 |                              |
| tomentosum     | "          | "             | "                 | "                                  | relatively narrow | sub-ovoid              | brown, stellate-tomentose             |         | brown           |                              |
| cassinoides    | "          | "             | "                 | "                                  | "                 | flask-shaped           | dull brown, scurfy                    |         | brown           |                              |
| lentago        | "          | "             | "                 | "                                  | "                 | "                      | dull leaden, scurfy                   |         | leaden          |                              |
| opulus         | "          | "             | "                 | "                                  | "                 | oblong, short-pointed  | glabrous                              |         | red to green    | shrivels, loses color        |
| americanum     | "          | "             | "                 | "                                  | "                 | ovoid                  | "                                     |         | "               | remains plump and bright red |

The new variety burkwoodii is recognized by Mr. Rehder as a variety of carlesii, from which it is easily distinguished by the less hairiness; twigs being puberulous or glabrous rather than tomentose.



The Genus *WEIGELA* is recognized thus

**SUMMER :** leaves opposite, short-petioled to sessile, serrate, without stipules; flowers in axillary cymes, often panicled at the end of branchlets; corolla funnelform, floral parts in 5's; fruit a 2-valved capsule.

**WINTER :** branches moderate, with solid pith, bark scurfy gray, with rather large circular lenticels; twigs straw-colored or brownish, with 2-4 decurrent hairy ridges from the nodes; leaf scars opposite or in whorls of three, broadly shallow crescent-shaped, connected by lines, with 3 bundle traces and no stipule scars; buds with several pairs of pointed scales, with superposed, sessile, oblong, appressed; fruits persistent, linear, 2-valved, dehiscent capsules, with the central partition exposed and extending.

#### Summer Key

| species                             | branchlets                    | flowers  | leaves   | under side of leaves  |
|-------------------------------------|-------------------------------|--|--|---|
| <i>Diervilla</i><br><i>lonicera</i> | glabrous or nearly so, terete | yellow   | hairy on edges                                     |   |
| <i>floribunda</i>                   | pubescent                     |  |  |   |
| <i>amabilis</i>                     | with 2 rows of hairs          | dark crimson, sepals linearly distinct, seeds winged | pubescent above<br>glabrous above except on midrib | villous pubescent chiefly on veins<br>pubescent or tomentose on veins |

#### Winter Key

| species                             | branchlets              | fruiting capsule         |
|-------------------------------------|-------------------------|--------------------------|
| <i>Diervilla</i><br><i>lonicera</i> | glabrous                | glabrous, slender-beaked |
| <i>amabilis</i>                     | with 2 rows of hairs    | glabrous                 |
| <i>floribunda</i>                   | pubescent or with hairs | pubescent                |

**XANTHOCERAS SORBIFOLIUM** is recognized thus

- SUMMER** : shrub or tree; leaves alternate, pinnately compound; the leaflets opposite, sessile, serrate; flowers showy white with a red or yellow blotch at the base of the petals, polygamous, in racemes, slender-stalked, the upper flowers fertile, lower ones usually sterile; fruit a green, 3-valved capsule
- WINTER** : a tree-like shrub; twigs moderate, terete, coarsely lenticular, glabrous; leaf scars alternate,  $\frac{3}{4}$ -elliptical, moderate, raised, with 3 large bundle traces and no stipule scars; buds moderate, solitary, sessile, round-ovoid, with about 6 more or less fringed or toothed scales, glossy chestnut brown.

**XANTHORRHIZA APIIFOLIA** (syn. *simplicissima*) is recognized thus

- SUMMER** : a small, low shrub with bitter bark and yellow root; leaves alternate, clustered, long-stalked, 3-parted, incisely toothed, celery-like; flowers brownish-purple, very small, in terminal pendulous compound racemes; fruit a one-seeded follicle, dry and dehiscent.
- WINTER** : twigs terete, moderate, smooth; leaf scars alternate, low, shallowly U-shaped, more than half encircling the twig, with 10-12 bundle traces and no stipule scars; buds very unequal, the terminal bud enlarged, spindle-shaped, with about 5 mucronate scales, the lateral buds small, solitary, sessile, ovoid-oblong, compressed and appressed, with three blunt scales.

**ZANTHOXYLUM AMERICANUM** is recognized thus

- SUMMER** : aromatic shrub or small tree; young branchlets pubescent, with large prickles in pairs below the nodes; leaves alternate, pinnately compound with 5-11 leaflets; leaflets opposite, ovate or elliptic, acuminate, entire, pubescent beneath, with pellucid dots; flowers before the leaves, dioecious, small, yellow-green, in axillary fascicles on two-year wood; fruit blackish.
- WINTER** : aromatic or pungently acrid, armed with detachable paired prickles which are often widened at the base; twigs moderate or a little stout, terete, with a creamy white pith; leaf scars alternate, broadly triangular or 3-lobed, scarcely raised, with a conspicuous articular membrane, with three bundle traces and no stipule scars; buds small to moderate, rusty-red, woolly, superposed, sessile, globose, with indistinct scales.

XANTHOCERAS      --      XANTHORRHIZA      --      ZANTHOXYLUM

## KEY TO THE WOODY CLIMBERS WHEN IN FOLIAGE

- A. Leaves evergreen.
  - leaves opposite, oval-oblong, smallish, toothed, pinnately veined . . . . . Euonymus
  - Leaves alternate, ovate, often lobed but not toothed, palmately veined or at least with 3 veins from the base . . . Hedera
- AA. Leaves deciduous.
  - B. Leaves opposite.
    - C. Leaves compound.
      - Climbing by aerial roots or by tendrils at the tip of the leaves . . . . . Bignonia
      - Climbing by twining petioles or stems . . . . . Clematis
    - CC. Leaves simple.
      - Climbs by twining stems or occasionally by aerial rootlets.
        - Sap milky . . . . . Periploca
        - Sap not milky
          - Leaves entire, short-stalked or sessile . . . . . Lonicera
          - Leaves toothed or lobed, distinctly petiolate.
            - Margin of leaves sparsely toothed, almost entire; leaf scars horseshoe-shaped . . . . . Decumaria
            - Margin of leaves distinctly serrate; leaf scars crescent-shaped . . . . . Hydrangea
            - Margin of leaves dentate; leaf scars C- or V-shaped . . . . . Schizophragma
  - BB. Leaves alternate
    - D. Stems prickly.
      - Leaves compound, margin toothed; habit scrambling . . . Rosa
      - Leaves simple, parallel-veined, margin entire; climbing by paired tendrils . . . . . Smilax
    - DD. Stems not armed.
      - E. Leaves compound.
        - F. Leaves palmately compound.
          - Leaflets 5, entire on the margin; climbs by twining . . . . . Akebia
          - Leaflets 3-5, toothed on the margin; climbs by tendrils or adhesive discs; pith white . . . Ampelopsis
        - FF. Leaves pinnately compound.
          - G. Leaflets three.
            - Leaflets lobed or stipuled, lobes entire, hairy on the margin; fruit bean-like . . . . . Pueraria
            - Leaflets sparsely and coarsely toothed; berries white (poisonous). . . Rhus radicans
          - GG. Leaflets more than 3, short-stalked.
            - Margin entire . . . . . Wisteria
            - Margin toothed . . . . . Bignonia
    - EE. Leaves simple.
      - H. Leaves palmately veined.
        - Leaves more or less lobed but not toothed; fruit with a flattened, curved stone; twining.
          - Flowers with 6-8 petals and 12-24 stamens; leaves peltate . . . . . Menispermum
          - Flowers with 6 petals and 6 stamens; leaves not peltate . . . . . Coccus
        - Leaves lobed and toothed.
          - Pith white; climbs by aerial rootlets and discs . . . . . Ampelopsis
          - Pith brown; climbs by elongated tendrils, usually forked . . . . . Vitis
          - Leaves not lobed nor toothed, - large, thin, ovate, flowers peculiar pipe-shaped . . . . . Aristolochia



HH. Leaves pinnately veined

I. Leaf margin entire

- Leaves often hastately lobed or divided  
at the base; odor rank when crushed . . . Solanum
- Leaves not lobed nor divided at the base; flow-  
ers and fruits small, in panicles . . . Polygonum

II. Leaf margin toothed

- Leaves large and coarse; marginal teeth  
bristle-tipped, petioles red . . . Actinidia
- Leaves moderate in size, finely toothed but  
not bristle-tipped . . . Celastrus

## KEY TO THE WOODY CLIMBERS IN WINTER

- A. Stems with prickles
  - Trailing or scrambling; prickles stout, curved; shoots terete and with a relatively large pith . . . . . Rosa
  - Climbing by stipular tendrils or twining; prickles slender, black; tendrils also present; shoots angled and without pith, i.e. endogenous as in a cornstalk . . . . . Smilax
- AA. Without prickles
  - B. Climbing by tendrils or twining petioles.
    - C. Climbing by tendrils only; tendrils forked, not thickened at tip; leaf scars alternate.
      - Hard-wooded, with much-flaking bark; pith brown . . . . . Vitis
      - Soft-wooded, with bark not flaking or only slightly so; pith white . . . . . Ampelopsis
    - CC. Petioles of leaves twining and assisting; stems strongly angled or ridged; leaves opposite, not disarticulating though dying . . . . . Clematis
  - BB. Climbing by aerial rootlets or discs.
    - D. Leaf scars alternate.
      - Leaf scars 2-ranked, rounded, with many bundle traces in an ellipse, and with long, narrow stipule scars; pith white . . . . . Ampelopsis
      - Leaf scars not 2-ranked nor rounded.
        - Leaf scars U-shaped; buds with about 2 fleshy scales; leaves evergreen . . . . . Hedera
        - Leaf scars broadly crescent-shaped or shield-shaped; buds stalked and naked (poisonous) . . . . . Rhus
    - DD. Leaf scars opposite.
      - Leaves evergreen . . . . . Euonymus
      - Leaves deciduous
        - Leaf scars shield-shaped, with one C-shaped bundle trace and the buds connected around the twig by a hairy line; stems terete . . . . . Bignonia
        - Leaf scars crescent-, U-, or horseshoe-shaped.
          - Buds with 4-6 outer scales; leaf scars crescent-shaped with 3 bundle traces . . . . . Hydrangea
          - Buds with 2 outer scales; scars U-shaped with 5 bundle traces . . . . . Schizophragma
          - Buds with indistinct scales; scars horseshoe-shaped with 3 bundle traces . . . . . Decumaria
  - BB. Climbing by twining stems.
    - E. Leaf scars opposite
      - Buds nearly concealed by the leaf base; sap milky . . . . . Periploca
      - Buds evident.
        - Stems warty; leaf scars low,  $\frac{1}{2}$ -round, and connected by hairy, transverse ridges, with 1 bundle trace . . . . . Bignonia
        - Stems smooth, hairy or glaucous; leaf scars small, crescent-shaped, on the narrowed ends of much-raised bases that are more or less connected by transverse lines, and with 1 bundle trace . . . . . Lonicera
- EE. Leaf scars alternate.
  - F. Buds concealed.
    - Buds buried in the thickened cortex or swelling above the leaf scar . . . . . Actinidia
    - Buds covered by the leaf scars; fruit with a ringlike or crescent-shaped stone.
      - Fruit red, stone transversely ribbed, compressed . . . . . Cocculus
      - Fruit black, stone curved & crested on back . . . . . Menispermum
  - FF. Buds evident
    - Buds superposed on a silky area in the arch of the U-shaped leaf scar . . . . . Aristolochia
    - Buds not as above
      - G. Buds with mucronate scales



- FF. Buds evident.  
 Buds superposed on a silky area in the arch of the  
 U-shaped leaf scar . . . . . Aristolochia  
 Buds not as above.
- G. Buds with mucronate scales.  
 Buds small, low, stout, subglobose, held at a  
 broad angle with the stem above the low leaf  
 scars, the latter with one bundle trace . . Celastrus  
 Buds ovoid, with numerous scales, directed  
 upward above the much raised leaf scars  
 with 3-6 bundle traces in a broken ellipse. .Akebia
- GG. Bud scales not mucronate.  
 Bark of twigs loose and shredding, not hairy; nodes  
 very long; buds shrivelled and ragged with  
 very loose scales . . . . . Polygonum  
 Bark firm, not loose nor shredding.  
 Buds narrowly oblong, acute at tip, and with  
 a hornlike or wartlike prominence at each  
 side of the base, giving them the appearance  
 of insects when held upside down; twigs  
 striped, not hairy, hard-wooded . . . . Wisteria  
 Buds not as above, twigs soft-wooded.  
 Twigs hairy and striped; leaf scars compara-  
 tively large, scarcely raised, with 2  
 bundle traces and large stipule scars;  
 buds flattened, thin . . . . . Pueraria  
 Twigs not hairy; leaf scars much raised and  
 with one bundle trace and no stipule scars.  
 Solanum

**ACTINIDIA ARGUTA** is recognized thus

- SUMMER** : a glabrous, unarmed twiner; leaves alternate, simple, petiolate, broad-ovate to elliptic, pinnately veined, serrate with bristle-tipped teeth; petioles red; flowers dioecious, in cymes or solitary, white, cup-shaped, with purple anthers; fruit a berry.
- WINTER** : stems orange-brown, glabrous, with a brownish, chambered pith; leaf-scars alternate, round, rather large, much raised, with one bundle trace and no stipule scars; buds tiny, green, embedded in the cortex or in a swelling above the leaf scar; end-bud lacking.

**AKEBIA QUINATA** is recognized thus

- SUMMER** : a twining vine, unarmed, glabrous; leaves alternate, palmately compound with five leaflets, long-petioled; leaflets oval to oblong, entire, petiolate, rounded both ends or emarginate at the tip; flowers slender-stalked, fragrant, dark red-violet; fruit oblong, usually in pairs, seldom seen in cultivation.
- WINTER** : twigs slender, rounded, twining; leaf scars alternate, with 6 or more bundle traces in a broken ellipse, and no stipule scars, half-elliptic, much raised; buds evident, small, sessile, stout, ovoid, pointed, held at a broad angle to the stem, with 10-12 mucronate scales, sometimes branching from the axils of the lower scales.

**ARISTOLOCHIA SIPHO** (syn. *durior*) is recognized thus

- SUMMER** : an unarmed twiner; stems greenish, glabrous, somewhat striate; leaves alternate, simple, entire, large kidney-shaped to ovate, thin, palmately veined; flowers pipe-shaped, greenish marked bronze; fruit a 6-ribbed capsule.
- WINTER** : unarmed stems terete, green, swollen at the nodes; leaf scars alternate, U-shaped, a little raised, with three bundle traces and no stipule scars; buds evident, superposed on a silky area in the arch of the U-shaped scar, with few scales, silky.

ACTINIDIA    --    AKEBIA    --    ARISTOLOCHIA

The Genus *AMPELOPSIS* is recognized thus (including *Parthenocissus*)

**SUMMER :** leaves long-petioled, palmately 3-5 parted or lobed, about as broad as long; stems round or slightly angled and with a firm bark; fruit a berry borne in cymes.

**WINTER :** woody climbers by means of tendrils or modified tendrils or aerial rootlets; stems round or slightly angled and with a firm bark; pith white or greenish; leaf scars half-round or nearly circular, with numerous bundle traces arranged in an ellipse; bark firm and close with prominent lenticels.

# Summer and Winter Keys combined

| species             | tendrils   | leaves                      | cymes                            | Young branchlets | leaflets                            | buds                                      | fall color |
|---------------------|--|-----------------------------|----------------------------------|------------------|-------------------------------------|---|------------|
| <i>aconitifolia</i> | without adhesive discs   | 5-parted                    | glabrous, fruit orange or yellow | glabrous         | lanceolate                          | small, with several outer scales          | no change  |
| <i>heterophylla</i> | "  | simple, 3-lobed             | on pilose stalks, vari-colored   | hairy            | broadly ovate                       | "   | "          |
| <i>quinquefolia</i> | with 5-12 branches with adhesive discs, tendrils and internodes long | 5-parted                    | crowded into terminal panicles   | round            | green                               | rounded, not large; with 2-4 outer scales | vivid hues |
| <i>henryana</i>     | "  | "                           | "                                | square           | with white markings, purplish below | "   | "          |
| <i>tricuspidata</i> | 5-12 adhesive discs, tendrils and internodes short                   | 3-lobed, simple or 3-parted | on short 2-leaved branchlets     | squarish         | green, purplish below               | "   | "          |

N.B. varieties of *quinquefolia* and of *tricuspidata* are distinguished from the type by their foliage, viz.--  
*quinquefolia engelmanni* -- leaves smaller and more dense.  
*tricuspidata lowi* -- leaves small, much curled  
*tricuspidata veitchii* -- leaves lobed, not divided.

*ARISTOLOCHIA SIPHO* -- see preceding page.

*AMPELOPSIS* -- *ARISTOLOCHIA*

The Genus BIGNONIA is recognized thus

(syn. Campsis)

Summer : a vine climbing by aerial rootlets; leaves opposite, pinnately compound; leaflets serrate, short-stalked, elliptic to ovate-oblong, acuminate, cuneate; flowers orange to scarlet, in terminal cymes or panicles, showy and conspicuous; corolla tubular-funneliform, with five rounded lobes; fruit a thick, almost bean-like pod which opens to disclose numerous winged seeds flattened about a central partition.

WINTER : a woody vine climbing by aerial rootlets; stems rounded, warty; leaf scars opposite, shield-shaped, low, with one C-shaped, compound bundle trace and no stipule scars but connected around the twig by hairy transverse ridges; buds rather small, usually solitary, sessile, triangular, compressed, ascending, with 2-3 pairs of outer scales.

#### Summer and Winter Keys combined

| species     | leaflets          | mode of climbing                       | floral color | capsule     | twig       |
|-------------|-------------------|--|--------------|-------------|------------|
| radicans    | pubescent beneath | by twining and by aerial rootlets      | orange       | apex beaked | puberulous |
| grandiflora | glabrous beneath  | twining; has few or no aerial rootlets | scarlet      | apex obtuse | glabrous   |

The Genus CELASTRUS is recognized thus

SUMMER : leaves alternate, petiolate, serrate, with small stipules; flowers in axillary cymes or terminal panicles, polygamo-dioecious, small, greenish, inconspicuous; fruit a yellow or orange capsule, dehiscent in 3 valves disclosing a fleshy crimson aril.

WINTER : Twigs moderate, twining; pith white, relatively large; leaf scars alternate, half-elliptic, low, with one transverse bundle trace and with very minute stipule scars or sometimes with the stipules remaining as tufted hairs; buds small, sessile, solitary, subglobose, with about 6 hard, mucronate scales.

#### Summer and Winter Keys combined

| species     | flower and fruit clusters | leaves                           | fruit color   | branches                      | scars                        |
|-------------|---------------------------|----------------------------------|---------------|-------------------------------|------------------------------|
| scandens    | terminal                  | ovate                            | orange-red    | lenticels scarcely noticeable | shield-shaped                |
| orbiculatus | axillary                  | sub-orbicular, oblong or obovate | orange-yellow | lenticels very prominent      | half-elliptical transversely |

BIGNONIA -- CELASTRUS

The Genus *GLENATIS* is recognized thus

SUMMER : leaves opposite, usually compound, rarely simple; flowers apetalous, sepals petaloid, stamens numerous, carpels many, becoming one-seeded achenes with a persistent, plumose style.  
 WINTER : soft-wooded climbers with much angled or ridged stems, the ridges being over the vascular bundles and having a cavity in the cortex under the ridges; pith angled, white; leaf petioles persistent, not disarticulating though dying, and prehensile (i.e. serving the function of climbing tendrils), without stipules or stipule scars; buds small, with 1-3 pairs of outer, rather hairy scales.

# Summer and Winter Keys combined

| species              | stems                           | stem color    | flowers    | twigs               | sepals  | leaflets   |
|----------------------|---------------------------------|---------------|------------|---------------------|---|--|
| paniculata           | 12-18<br>ridged                 | straw-colored | monoecious |                     |   | entire, or<br>occasionally lobed                                 |
| virginiana           | 6 primary<br>ridges<br>stronger | brown         | dioecious  | finely<br>pubescent |   | ovate, variously few-toothed<br>or coarsely dentate              |
| lawsoniana<br>henryi | "                               | "             | monoecious | "                   | 4-6, ovate<br>or elliptic,<br>overlapping<br>leaflets | ovate-lanceolate, acuminate,<br>simple or with three<br>leaflets |
| jackmanni            | "                               | "             | "          | glabrate            | 4-6 obovate   | ovate, acute, ternate<br>or pinnate                              |

## *COCULUS CAROLINUS* is recognized thus

SUMMER : an unarmed climber with pubescent branchlets; leaves alternate, simple, palmately veined, entire or shallowly 3-5 lobed, orbicular to triangular-ovate, obtuse and mucronulate at the tip, rounded at the base, pubescent and glaucescent beneath, glabrous above, rather long petioled; flowers dioecious, small, in short or sometimes spike-like panicles, with six petals and six stamens; fruit subglobose, red drupes with the stones curved, compressed, and transversely ridged.  
 WINTER : stems greenish to tan, twining, fluted, slender, terete; leaf scars alternate, elliptical, raised, concave, with 3-7 bundle traces and no stipule scars; buds small, hairy, superposed, the upper developing inflorescence, the lower covered by the leaf scars, with about three indistinct scales.

## *DECUMARIA BARBARA* is recognized thus

SUMMER : a deciduous or sub-evergreen climber by aerial rootlets; bark peeling; leaves opposite, petiolate, ovate to elliptic, entire or sparsely toothed, acute, glabrous, stipulate, lustrous above; flowers in rounded, terminal corymbs, white, small; fruit an urn-shaped capsule, ribbed between the seeds.  
 WINTER : climbing by aerial rootlets; stems slender, round, exfoliating; pith greenish; leaf scars opposite, horseshoe-shaped, raised, concave, connected by a line around the twig, with three bundle traces and no stipule scars.

COCULUS    --    *GLENATIS*    --    *DECUMARIA*



The Genus LONICERA is recognized thus

SUMMER : twining, woody vines; leaves opposite, short-petioled or sessile, entire, sometimes connate, without stipules; flowers short-pedicelled in axillary pairs or in sessile terminal whorls; fruit a berry.

WINTER : woody vine which climbs by twining; subevergreen; twigs rounded, slender; leaf scars opposite, crescent-shaped, small, on the extremities of raised bases which are more or less connected by lines around the twig, with three bundle traces and no stipule scars; buds often superposed, the lowermost largest and developing inflorescence, sessile, with 2 to numerous 4-ranked scales.

#### Summer and Winter Keys combined

| species      | leaf color           | leaves            | flowers                                    | fruits | stems               |
|--------------|----------------------|-------------------|--|--------|---------------------|
| japonica     | deep rich green      | oval              | white to yellow                            | black  | pubescent, grayish  |
| sempervirens | blue-green, glaucous | ovate and connate | trumpet-shaped, red outside, yellow within | red    | glabrous, yellowish |

#### MENISPERMUM CANADENSE is recognized thus

SUMMER : a twiner with a persistent root and woody base but the upper growth less persistent; young growth pubescent; leaves orbicular, the petiole attached inside the margin, long-petioled, entire or shallowly 3-7 lobed, acute or obtuse, glabrescent; flowers small in loose panicles, not peduncled; fruit a subglobose drupe, blue-black, with a crescent-shaped stone crested on the back.

WINTER : semi-woody twiner; twigs round, fluted, slender, with a relatively large, white pith; leaf scars alternate, elliptical, concave on the face, and raised at the edges, with 3-7 bundle traces and no stipule scars; buds small, hairy, superposed, with the uppermost developing inflorescence and the lower covered by the leaf scar, with about 3 indistinct scales; fruit sometimes persisting, with a crescent-shaped stone crested on the back.

#### PERIPLOCA GRAECA may be recognized thus

SUMMER : a strong climber with glabrescent twigs; leaves opposite, ovate or elliptic to oblong-lanceolate, long acuminate, lustrous, entire; flowers in axillary or terminal cymes, greenish-yellow outside, purplish within; calyx glandular inside; fruit of two cylindric follicles cohering at the apex.

WINTER : a soft-wooded climber; sap milky; stems terete, twining; pith excavated; leaf scars opposite, raised, shrivelled or elliptical, with one crescent-shaped bundle trace and no stipule scars; buds small, solitary, almost concealed by the much raised leaf bases.

LONICERA      --      MENISPERMUM      --      PERIPLOCA

PARTHENOCISSUS -- see Ampelopsis

The Genus POLYGONUM is distinguished thus

SUMMER : Leaves with tubular or sheath-like stipules, alternate, simple, ovate, entire, pinnately veined, lustrous, slender-petioled; flowers small, in racemes collected into small panicles, white or pinkish, showy because so profuse; fruit a small achene, triangular, enclosed by the persistent perianth.

WINTER : unarmed, twining woody climbers with jointed stems; bark loose and shredding; nodes very long; stems glabrous, green striped, slender, often dying back at the top; leaf scars alternate, crescent-shaped, narrow, with 3 bundle traces and narrow-linear stipule scars connected by a line around the twig; buds evident, shrivelled and ragged with thin, very loose scales; fruit more or less persistent, a small, triangular achene enclosed by 3 bracts and borne in racemes or panicles.

| species        | inflorescence                      | floral color | fruit             |
|----------------|------------------------------------|--------------|-------------------|
| auberti        | erect, minutely scabrous-pubescent | white        | scarce or lacking |
| baldschuanicum | drooping, nearly glabrous          | pinkish      | profuse, large    |

PUERARIA THUNBERGIANA is recognized thus

SUMMER : a twining, high-climbing, unarmed vine of very rapid growth; root a fleshy tuber; leaves alternate, pinnately compound, 3-parted, stipulate; leaflets large, often lobed, stipellate, margin entire, hairy; flowers blue-violet, pea-like, in long dense, axillary racemes; bracts and bractlets small, soon drooping; fruit an elongated, 2-valved, bean-like pod.

WINTER : bark firm, branchlets striped, soft-wooded, hairy, dying back to the base in winter, internodes long; root persistent, fleshy, tuberous; leaf scars alternate, scarcely raised, comparatively large, with 2 bundle traces and large stipule scars; buds flattened, thin, scales obtuse or acute.

SCHIZOPHRAGMA HYDRANGEOIDES is recognized thus

SUMMER : a vine climbing by aerial rootlets; bark of the older branches with longitudinal fissures; leaves opposite, long-petioled, broadly ovate, sparsely and coarsely dentate, short-acuminate, cordate, nearly glabrous, estipulate; flowers small, whitish, in loose, peduncled corymbs margined with sterile flowers having a single large white sepal; fruit a conical, ribbed capsule containing many seeds.

WINTER : stems brown, rather slender; bark finally splitting longitudinally and peeling; leaf scars opposite, U-shaped, raised, nearly meeting, with 5 bundle traces and no stipule scars; buds smallish, developing into short spurs, solitary, with 2-4 outer scales which are golden-brown, pubescent, and inclined to be ciliate; end-bud somewhat enlarged.

PARTHENOCISSUS -- PUERARIA -- SCHIZOPHRAGMA

The Genus SMILAX is recognized thus

SUMMER : woody climbers with paired tendrils on the base of the petiole; those on the list given below all having distinct but narrow stipules with tendrils; stems often prickly, little branched at the base; lower leaves much reduced, upper leaves entire or sometimes slightly 3-lobed, with parallel veination; flowers dioecious, small, inconspicuous, in axillary umbels; fruit a small, black berry with 1-to several seeds.

WINTER : a vine climbing by tendrils, armed with straight, often strong prickles; stems terete or angular, the woody fibers embedded in the pithy stalk as in a cornstalk i.e. endogenous; leaves tearing away above the clasping base, thus leaving no definite scar but carrying 10-12 vascular bundles, the stipules or their equivalent persisting as tendrils on these leaf bases; buds triangular, pointed, widely divergent, with one bud-scale, enclosed in the remnant of the leaf base.

#### Summer Key

| species             | leaves                  | fruits               | peduncles                 | fruit seeds |
|---------------------|-------------------------|----------------------|---------------------------|-------------|
| <i>glauca</i>       | very glaucous below     | bloomy               | much longer than petioles | 3-seeded    |
| <i>hispida</i>      | glabrous or glabrescent | not bloomy           | "                         | 1-seeded    |
| <i>rotundifolia</i> | "                       | not bloomy, lustrous | shorter than petioles     | 3-seeded    |

#### Winter Key

| species             | stems        | stem color | prickles                              |
|---------------------|--------------|------------|---------------------------------------|
| <i>glauca</i>       | glaucous     | brownish   | few                                   |
| <i>hispida</i>      | not glaucous | green      | stout, flattened at base, dense below |
| <i>rotundifolia</i> | not glaucous | green      | needle-like, black, few               |

SOLANUM DULCIMARA is recognized thus

SUMMER : a scrambling shrub; branches sometimes spiny; leaves alternately, simple or compound, ovate to ovate-oblong, entire, lobed at the base, acuminate, cordate, puberulent, petiole short to moderate; flowers in cymes, rarely solitary, shallow-bell-shaped, with connivent anthers like a potato blossom; fruit an ovoid, scarlet berry in drooping clusters. Fruits are said to be poisonous.

WINTER : a soft-wooded scrambler, slightly inclined to twine; stems slender, somewhat angular or terete, pith large, greenish, spongy; leaf scars alternate,  $\frac{1}{2}$ -round, much raised, with one rather large bundle trace and no stipule scars; buds subglobose, small, solitary, sessile, with 4 hairy, obtuse outer scales; vestiges of fruit clusters often remaining, opposite the leaf scars or beside the axils.

SMILAX -- SOLANUM

The Genus VITIS is recognized thus

SUMMER : Woody vines climbing by means of tendrils; pith brown, usually interrupted at the nodes by diaphragms; leaves alternate, simple, coarsely dentate, usually lobed; flowers in panicles opposite the leaves; fruit a pulpy 2-4 seeded berry borne in dense panicles.

# Summer Key

| species    | basal sinus of leaves                               | under side of leaves                     | leaf form                       | tomentum                                 | tendrils       | branchlets        |
|------------|---|--|---------------------------------|--|----------------|-------------------|
| cordifolia | narrow; leaves ovate, undivided or slightly 3-lobed | green and glabrous or slightly pubescent |                                 |  |                | terete, glabrous  |
| vulpina    | wide; leaves broader                                | "  |                                 |  |                |                   |
| aestivalis | lobes often overlapping                             | floccose *                               | deeply lobed with round sinuses | flocculent or cobwebby or glaucous below | intermittent** | terete            |
| coignetiae | indistinct  | "  | not or indistinctly lobed       | brownish floccose                        | "              | "                 |
| cinerea    | open, wide  | "  | "                               | grayish floccose                         | "              | distinctly angled |
| labrusca   | open  | densely and persistently brown tomentose | slightly 3-lobed                | brown, dense                             | continuous***  | terete            |

\* with bunches of soft hair or wool

\*\* often skipping a node

\*\*\* one at each node

VITIS -- Summer Key

The Genus VITIS is recognized thus

WINTER : woody climbers with forked tendrils opposite the leaf scars; bark shredding in long strips, without lenticels; pith brown; twigs striate or angled; leaf scars alternate, 2-ranked, half-round or crescent-shaped, with several bundle traces arranged in a C and with long, narrow stipule scars; buds subglobose, with two broad scales, collaterally branching; end-bud lacking.

# Winter Key

| species    | twig bark      | twigs             | tendrils        | nodal diaphragms | fruit panicles              |
|------------|----------------|-------------------|-----------------|------------------|-----------------------------|
| cinerea    | gray woolly    | distinctly angled | intermittent    |                  |                             |
| coignetiae | brown woolly   | distinctly angled | intermittent    |                  |                             |
| labrusca   |                | nearly terete     | continuous *    |                  |                             |
| vulpina    |                | "                 | intermittent ** | thin             |                             |
| cordifolia |                | "                 | "               | thick            | vestiges open and large     |
| aestivalis | brown floccose | "                 | "               | "                | vestiges compactly branched |

\* one at each node

\*\* often skipping a node

VITIS -- Winter Key



The Genus *WISTERIA* is recognized thus

**SUMMER** : woody twiners; leaves pinnately compound, with 9-19 leaflets with stipules soon falling, alternate; leaflets shortly petioled, alternate, stipellate; flowers light purplish or white, pea-like, in long racemes, the flowers opening from base to apex gradually; fruit an elongated bean-like pod, somewhat contracted at intervals.

**WINTER** : woody vines which climb by twining; stems moderate, slightly fluted; leaf scars alternate, transversely elliptical, much raised, and with a horn- or wart-like protuberance on each side at the base, so that bud and scar together have the appearance of an insect when viewed upside down, with one bundle trace and no stipule scars; buds medium to medium-large, solitary, sessile, narrowly oblong and acute at the tip and nearly surrounded by the outer scale.

#### Summer and Winter Keys combined

N.B. *Wisteria* species are difficult to distinguish in winter, but possible if one have fruits as well as twigs.

| species           | leaflets            | branchlets            | fruit pods                                      | flower clusters                 |
|-------------------|---------------------|-----------------------|---|---------------------------------|
| <i>floribunda</i> | 13-19               | slightly pubescent    | velvety, 10-15 cm. long, narrowed near the base | very long                       |
| <i>frutescens</i> | usually fewer, 9-13 | glabrous or nearly so | glabrous, 5-10 cm. long, compressed             | racemes 4-5" or less in length  |
| <i>sinensis</i>   | "                   | pubescent             | 10-15 cm. long, densely velutinous, 1-3 seeded  | racemes 6-12" or more in length |

*WISTERIA*

## KEY TO THE HARDY BROAD-LEAVED EVERGREENS

- A. Climbing by aerial rootlets.
  - Branchlets terete; leaves alternate, lobed or broadly ovate, margin entire . . . . . Hedera
  - Branchlets square or 4-angled; leaves opposite, ovate to obovate or narrow-elliptic, margin toothed . . . . . Euonymus
- AA Not climbing.
  - B. Leaves whorled.
    - Leaves small, linear, revolute, regularly whorled . . . . Erica
    - Leaves larger, oblong-obovate, serrate, in irregular whorls . . . . . Chimaphila
  - BB. Leaves opposite.
    - Leaves scalelike, 4-ranked, keeled, auricled at the base; corolla 4-parted, persistent; flowers in terminal spikes . . . . . Calluna
    - Leaves ordinary, not scalelike.
      - C. Leaf margin entire.
        - Habit prostrate . . . . . Vinca
        - Habit erect.
          - D. Branchlets square; leaves ovate to oblong; buds with several scales . . . . . Buxus
      - DD. Branchlets terete; leaves oblong to elliptic, revolute, not dotted; buds with two outer scales . . . . . Kalmia
  - CC. Leaf margin serrate or serrulate.
    - Branchlets square or 4-angled.
      - With very small linear or narrow-oblong leaves, somewhat revolute and finely serrate above the middle . . . . Pachistema
      - With broader, lustrous leaves, ovate to obovate or narrow-elliptic . . . . . Euonymus
    - Branches terete and tomentose; leaves large and strongly wrinkled, and tomentose beneath . . . . . Viburnum  
(see shrub keys )
  - BBB. Leaves alternate.
    - E. Leaves pinnately compound.
      - Prostrate half-evergreen, armed with strong prickles . . Rosa
      - Erect, evergreen, unarmed; leaves spinose-dentate . . Mahonia
    - EE. Leaves simple.
      - Leaf margins sinuately spiny; some leaves 3-foliolate . . Berberis
      - Leaves not as above.
        - A low plant with obovate leaves 3-nerved at the base and dentate . . . . . Pachysandra
        - Leaves not obovate or not 3-nerved at the base.
          - Branches thorny . . . . . Pyracantha
          - Branches not thorny.
            - F. Habit prostrate, creeping or trailing.
              - Leaves and stems bristly with rusty hairs; leaves oval, rounded or heart-shaped; flowers salverform in terminal clusters, very fragrant . . . . . Epigaea
            - Not as above
              - Stems creeping on or below the surface sending up sparse erect branches with a few leaves at the tip; leaves glossy dark green, obscurely serrate and with a spicy-aromatic flavor . . Gaultheria
              - Stems trailing; leaves with margin entire and without the spicy-aromatic flavor.
                - Leaves narrow, oblanceolate, glaucous beneath, with a sharp-pointed tip; branches pubescent . . . . . Daphne
                - Leaves broader, obovate-oblong, thick, with finely impressed veins, wedge-

- shaped at the base, and with  
the tip obtuse or retuse; bark  
exfoliating . . . . . Arctostaphylos
- FF. Habit erect.  
Leaves fragrant when crushed, slightly  
rugose above, and densely brown-  
tomentose beneath, tip very obtuse . Ledum  
Not as above.
- G. Leaves toothed on the margin.  
Leaf margins with spiny teeth . . . . Ilex  
Marginal teeth not spiny, margins  
serrulate or obscurely toothed.  
Leaves glandular black-dotted beneath . . .  
Pieris
- Not glandular beneath.  
Leaves covered with scurfy scales  
beneath; margin obscurely  
denticulate . . . . . Chamaedaphne
- Leaves not scurfy-scaly beneath,  
conspicuously petiolate, broadly  
lanceolate, acuminate; marginal  
teeth bristle-tipped . . . Leucothoe
- GG. Margins entire.  
Leaves linear and revolute . . . . Andromeda  
Leaves not linear.
- H. Leaves lighter beneath.  
Under side yellowish; leaves  
cuneate and revolute . . Kalmia  
Under side whitish; leaves ellip-  
tic to oblong.  
Evergreen . . . . . Rhododendron  
Deciduous . . . . . Azalea
- HH. Leaves green beneath or hairy,  
rounded or oval . . . . . Cotoneaster  
(see deciduous shrubs)

The Genus AZALEA is recognized thus

SUMMER : upright shrubs; leaves alternate, short-petioled, entire or ciliate; flowers from leafless terminal or lateral buds; lateral buds clustered at the ends of branchlets; corolla funnel-form; stamens 5-10, more or less exserted; fruit a capsule.

| species            | flowering season         | foliage         | young bark                                    | branchlets                 | under side of leaves                             | corolla tube                        | twigs                 | corolla                          | shape of leaves          | upper side of leaves |
|--------------------|--------------------------|-----------------|---|----------------------------|--|-------------------------------------|-----------------------|----------------------------------|--------------------------|----------------------|
| amoena (obtusum)   | before the leaves        | sub-evergreen   | with flat chaff-like scales rather than hairs |                            |  | shorter than the lobes              |                       |                                  | obtuse                   |                      |
| mucronulatum       | "                        | "               | "   | glabrate                   | pale with scattered glands                       |                                     | glabrate              | puberulous                       | broadest near base acute |                      |
| kaempferi          | "                        | deciduous, thin | "   |                            |  | shorter than the lobes              |                       |                                  |                          |                      |
| japonicum          | "                        | "               | not chaffy-scales, but pubescent or glandular | glabrous                   | bristly on veins                                 | "                                   |                       |                                  |                          |                      |
| (canescens) roseum | "                        | "               | "   | finely pubescent           | gray-pubescent                                   | "                                   |                       |                                  |                          |                      |
| nudiflorum         | "                        | "               | "   | pubescent                  | glabrous except midribs                          | as long as or longer than the lobes |                       |                                  |                          |                      |
| vaseyi             | "                        | "               | "   | puberulous                 | "  | shorter than the lobes              |                       |                                  |                          |                      |
| arborescens        | with or after the leaves | "               | "   | glabrous                   | glabrous   | as long as or longer than the lobes | glabrous              | white                            | broadest near tip        | glabrous             |
| viscosum           | "                        | "               | "   | with stiff appressed hairs | hairy appressed bristles on midrib               | "                                   | hairy and sticky      | usually white viscid & glandular | "                        | "                    |
| calendulaceum      | "                        | "               | "   | pubescent                  | pubescent  | "                                   | pubescent             | fiery red                        | "                        | finely pubescent     |
| canadense *        | "                        | "               | "   | puberulous, often bloomy   | hairy, sparingly glandular on midrib or glaucous | shorter than the lobes              | puberulous when young | rose purple                      | broadest at middle       | slightly pubescent   |

\*Rhodora canadense Although deciduous, Azalea is placed in this section because of its very close relation to Rhododendron

AZALEA -- Summer Key

The HARDY AZALEAS are recognized thus

WINTER : erect shrubs with deciduous leaves; twigs moderate, terete; pith rather small, slightly colored, continuous; buds solitary, sessile, clustered above thus causing the branches to cluster near the end of the season's growth; upper buds enlarged, ovoid, with about 6 ciliate scales; flower buds still larger; lower buds increasingly smaller and with fewer scales; leaf scars alternate, low, shield-shaped, notched or straight at the top, with one bundle trace and no stipule scars; fruit often persistent, oblong, 5-valved capsules.

N.B. See key to Rhododendron

| species          | foliage         | twigs  | leaf scars               | pedicels                | flower buds                        | branchlets                       | buds                             | capsules                | bud color |
|------------------|-----------------|--|--------------------------|-------------------------|------------------------------------|----------------------------------|----------------------------------|-------------------------|-----------|
| amoena (obtusum) | sub-evergreen   | with flat, chaffy-like scales rather than hair |                          |                         |                                    |                                  |                                  |                         |           |
| kaempferi        | deciduous, thin | "  |                          |                         |                                    |                                  |                                  |                         |           |
| mucronulatum     | "               | "  | low                      | scaly                   |                                    | buff-orange                      | glandular-dotted                 |                         |           |
| vaseyi           | "               | not chaffy-scaly but pubescent or glandular    | raised, scarcely notched |                         |                                    |                                  | glandular                        |                         |           |
| japonicum        | "               | "  | not raised               | tomentulose & glandular |                                    | glabrous, sometimes setose       | "                                |                         |           |
| canadense        | "               | "  | "                        | sparsely long-hairy     | of a few scales which drop early   | puberulous often bloomy          | puberulous                       |                         |           |
| roseum           | "               | "  | "                        | glandular               | of numerous much-imbricated scales | tomentulose or villous-pubescent |                                  |                         |           |
| arborescens      | "               | "  | "                        | glabrous                | "                                  | entirely glabrous                | glandular                        |                         |           |
| viscosum         | "               | "  | "                        | bristly                 | "                                  | glabrate or glandular            | puberulous with spreading glands |                         |           |
| nudiflorum       | "               | "  | "                        | "                       | "                                  | "                                | glandular with ascending hairs   | rosy                    |           |
| calendulaceum    | "               | "  | "                        | sparsely long-hairy     | "                                  | sparsely long-hairy              | "                                | glabrous, not glandular | brown     |



The Genus *BUXUS* is recognized thus

evergreen shrubs or small trees; twigs slender, green, flat-grooved between each pair of leaves; leaves opposite, small, leathery, almost elliptical, entire, short-petioled, glabrous, with one main vein; buds sessile, solitary, small, ovoid, with 2-4 scales; flower-buds larger and multiple; leaf scars minute, raised, crescent-shaped, with one bundle trace and no stipule scars; flowers small, inconspicuous, in axillary or terminal clusters; fruit an obovoid, 3-horned capsule with two lustrous black seeds.

| species             | variety           | leaves  | branchlets                 | flowers               | habit |
|---------------------|-------------------|---|----------------------------|-----------------------|-------|
| <i>sempervirens</i> |                   | elliptic to lance-oblong; broadest at or below the middle | usually a little pubescent | axillary clusters     |       |
| <i>microphylla</i>  | <i>myrtifolia</i> | small, elliptic-oblong                                    |                            |                       | low   |
|                     |                   | obovate to oblong-obovate broadest above the middle       | usually glabrous           | mostly terminal       |       |
|                     | <i>koreana</i>    | obovate, emarginate, pubescent on the midrib above        | softly pilose              | axillary and terminal |       |

*CALLUNA VULGARIS* is recognized thus

a small evergreen shrub; leaves opposite, scalelike, 4-ranked, keeled, sessile, auricled at the base; oblong-ovate, puberulous or nearly glabrous; flowers pink in dense racemes or terminal spikes, corolla 4-parted, persistent; fruit a 4-valved capsule; twigs very slender, rounded; buds solitary, sessile, small, globose and angular, with about 3 outer scales.

*CHAMAEDAPHNE CALYCVLATA* is recognized thus

A low erect shrub with numerous spreading branches, bushy and unarmed; leaves alternate, simple, obovate to oblong, scurfy, short-petioled, revolute, obscurely toothed or nearly entire, with one main vein; flowers white, short-pedicelled, in terminal, nodding, leafy racemes on the under side of the branches; fruit a dehiscent capsule; twigs slender, with a shredding gray bark, finally smooth, red-brown.

*CHIMAPHILA UMBELLATA* is recognized thus

a small, low-growing, half-shrubby or herbaceous plant with long, running underground stems sending up leafy shoots tufted with leaves at the top; leaves whorled, moderate size, oblong-obovate, serrate, short-petioled, thick and shining; flowers in nodding, terminal, stalked clusters, white or reddish; fruit a globose capsule.

BUXUS -- CALLUNA -- CHAMAEDAPHNE -- CHIMAPHILA

The Genus DAPHNE is recognized thus

Evergreen or deciduous shrubs; winter buds with several outer scales; leaves alternate, rarely opposite, short-petioled, entire, simple, narrow, oblanceolate, with one main vein, acute, glaucous-cent beneath; flowers perfect, apetalous, in terminal or axillary short racemes or umbels, usually with bracts; calyx tube campanulate to cylindric, usually 4-lobed, corolla-like, usually pubescent on the outside; stamens 6-10 in two rows, included; stigma capitate, sessile, or on a short style; ovary without disk at the base, or a ringlike disk, or one entire scale; fruit a leathery or fleshy one-seeded drupe.

| species  | leaves  | corolla                      | habit                          | flowers                 |
|----------|---|------------------------------|--------------------------------|-------------------------|
| mezereum | deciduous, alternatesilky-pubescent<br>glabrous |                              | erect to 3' or 4'              | axillary along old wood |
| cneorum  | evergreen                                       | densely pubescent<br>outside | low or procumbent<br>1' to 1½' | in terminal heads       |

EPIGAEA REPENS is recognized thus

a prostrate plant, carpeting the ground; leaves and stems bristly with rusty hairs; twigs slender; leaves alternate, simple, oval to elliptical-ovate, with one main vein, entire and ciliate, short-petioled; flowers in terminal clusters, white tinged pink, very fragrant, 5-lobed; fruit a capsule, globular, splitting into a 5-parted rosette with a fleshy, berry-like interior.

DAPHNE -- EPIGAEA

The Genus *ERICA* is recognized thus

a low, spreading shrub, often forming matlike growths; leaves small, linear, revolute, petiolate, regularly whorled, mostly longer than the internodes of the very slender stems; flowers pink or white, in terminal spikes or panicles; fruit a 4-valved capsule, ovoid or subglobose, enclosed in the persistent corolla.

| species   | anthers        | leaves and calyx tubes | branchlets                          | inflorescence                      | location of anthers      | sepals                           | sepal form | leaves         |
|-----------|----------------|------------------------|-------------------------------------|------------------------------------|--------------------------|----------------------------------|------------|----------------|
| tetralix  | appendaged     | conspicuously ciliate  | minutely villous, glandular hirsute | terminal, umbel-like               |                          |                                  |            |                |
| ciliaris  | not appendaged | "                      | densely pubescent                   | terminal spikes                    |                          |                                  |            |                |
| cinerea   | appendaged     | glabrous               | finely pubescent                    | terminal racemes or panicles       |                          |                                  |            | whorled in 3's |
| scoparius | not appendaged | "                      | glabrous                            | axillary, cylindrical spikes       | included in corolla tube |                                  |            |                |
| vagens    | "              | "                      | "                                   | lateral                            | exserted                 | less than as long as the corolla | ovate      |                |
| carnea    | "              | "                      | "                                   | axillary, forming terminal racemes | "                        | more than as long as corolla     | lanceolate |                |

*GAULTHERIA PROCUMBENS* is recognized thus

a low, tufted, spreading plant with a procumbent stem, spreading by creeping roots; leaves alternate, simple, oval, entire, with a spicy-aromatic flavor, glossy deep green, with one main vein, obscurely serrate, glabrous, short-petioled; flowers axillary, urn-shaped, nodding, pinkish-white; fruit a bright red, spicy-flavored berry, nearly globular, slightly 5-lobed at the top.

*HEDERA HELIX* is recognized thus

a vine creeping or climbing by small rootlets at the nodes; branchlets terete, nodes long; leaves alternate, lobed or broadly ovate, margin entire; flowers in globose umbels terminal on high-climbing branches, inconspicuous; fruit a 3-5 seeded drupe, black, and berrylike, not formed in northern states.

*ERICA* -- *GAULTHERIA* -- *HEDERA*

The Genus *ILEX* is recognized thus  
 evergreen or deciduous shrubs or trees; leaves alternate, simple, moderate in size, stipular, odorless, often spiny-toothed; twigs smooth dark gray marked lighter gray, lenticular, somewhat angular, often spurlike, with crowded leaf scars; buds small, sessile, broadly ovoid, usually superposed, with 2-6 outer scales; flowers solitary and axillary or fasciated in cymes, 4-merous; fruit a small drupe with several bony nutlets; leaf scars crescent-shaped, raised, clustered near ends of twigs but with longer internodes on older growth, with one bundle trace and minute stipule scars or persistent stipules.

| species             | leaves    | flowers and fruits  | fruit color | leaf margin  | flowers    | leaf apex     |
|---------------------|-----------|---|-------------|--|------------|---------------|
| <i>verticillata</i> | deciduous |   |             |  |            |               |
| <i>aquifolium</i>   | evergreen | axillary on last year's branchlets, usually clustered                   |             | spiny with large triangular teeth                  |            |               |
| <i>opaca</i>        | "         | solitary or in solitary peduncled clusters axillary on young branchlets | red         | coarsely spiny-toothed                             |            |               |
| <i>glabra</i>       | "         | "   | black       | with few obtuse teeth near apex or entire          | 5-6-merous | obtuse        |
| <i>crenata</i>      | "         | "   | "           | serrate or crenate, only a few teeth near the apex | 4-merous   | sharp-pointed |

The Genus *KALMIA* is distinguished thus

evergreen undershrubs, poisonous in all parts; twigs moderate, gray; leaf scars clustered on new growth but with longer internodes on older wood, shield-shaped, with a linear bundle trace and no stipule scars; buds with two outer scales; leaves alternate, opposite or whorled, petiolate, entire; flowers in terminal or lateral corymbs, corolla saucer-shaped with ten small pouches which hold the anthers bent over into them, the latter springing up suddenly to discharge pollen when touched; fruit a 5-valved dehiscent capsule containing numerous minute seeds.

| species             | arrangement        | leaf tip | leaves               | inflorescence      | pod                      | flowers  |
|---------------------|--------------------|----------|----------------------|--------------------|--------------------------|----------|
| <i>latifolia</i>    | mostly alternate   | acute    | distinctly petioled  | compound (corymbs) | depressed glandular      | terminal |
| <i>angustifolia</i> | opposite or in 3's | obtuse   | short-petioled       | compound           | depressed, nearly smooth | lateral  |
| <i>polifolia</i>    | "                  | "        | sessile or nearly so | simple (umbels)    | ovoid, smooth            | terminal |

**LEDUM GROENLANDICUM** is recognized thus

a dwarf evergreen shrub twigs rusty-tomentose, slightly triangular; leaves alternate, simple, oblong entire, revolute, fragrant when crushed, slightly rugose above, densely brown tomentose beneath; leaf scars minute, slightly raised, triangular, with one bundle trace and no stipule scars; buds small, solitary, sessile, conical or globose, with 2-3 outer scales; flowers white in largish terminal umbel-like clusters, showy, puberulous; fruit an oblong capsule, more or less persistent.

**LEUCOTHOE CATESBAEII** is recognized thus

An arching under-shrub; twigs reddish and puberulous when young; leaves alternate, simple, lanceolate, lustrous, leathery, slightly spinulose-toothed, short-petioled, lighter on the under side, acuminate; leaf scars small, crescent-shaped, scarcely raised, with one bundle trace and no stipule scars; buds small, globose, solitary, sessile, with 3-4 outer scales; end-bud lacking; flowers white, rarely pink, in sprays or loose axillary racemes drooping below the branches, very fragrant; fruit a subglobose 5-lobed capsule, often persistent.

**MAHONIA AQUIFOLIUM** is recognized thus

an erect unarmed shrub; twigs smooth, slightly glaucous, rather stout; leaves alternate, pinnately compound, spinose-dentate; leaflets 5-9, ovate to oblong-ovate, stiff and leathery; leaf scars narrow, low, half-encircling the twig, with numerous bundle traces and no stipule scars; buds smallish with about 6 outer scales; terminal bud enlarged; flowers yellow racemose, in showy terminal masses; fruit a small, glaucous, blue berry.

|       |    |           |     |         |
|-------|----|-----------|-----|---------|
| LEDUM | -- | LEUCOTHOE | --- | MAHONIA |
|-------|----|-----------|-----|---------|



**PACHISTIMA CANBYI** is recognized thus

a low shrub; twigs square or 4-angled, inclined to be warty; bark becoming rather corky and checked; leaves opposite, small, linear or narrow-oblong, somewhat revolute, serrulate above the middle, short-petioled; leaf scars minute, crescent-shaped, slightly raised, with one indistinct bundle trace and no stipule scars; buds solitary, sessile, ovoid, appressed, very small, with 2 outer scales; flowers small, axillary, 4-merous, in few-flowered cymes; fruit a 2-valved capsule.

**PACHYSANDRA TERMINALIS** is recognized thus

evergreen, procumbent plants with fleshy stems and matted creeping rootstalks; glabrous; leaves tufted at the top of the short stems, alternate, simple, obovate, coarsely dentate, acute, cuneate, 3-nerved at the base; flowers tiny, whitish, in inconspicuous terminal spikes; fruit a 3-horned whitish drupe.

**PYRACANTHA COCCINEA** is recognized thus

a low, horizontally spreading shrub of very irregular outline, armed with slender, spreading, purple spines; buds small, sessile, solitary or collaterally branched in spine formation, broadly ovoid, pubescent, with about 6 outer pointed scales; leaves alternate, simple, narrow-elliptic to lanceolate to oblanceolate, acute, cuneate, toothed or entire, short-petioled, glabrous; leaf scars crescent-shaped or 3-lobed, with three bundle traces and minute stipule scars; flowers white in compound corymbs; fruit a small pome with a persistent calyx, subglobose, orange-red.

The variety **LALANDI** is more vigorous in growth, has more slender branches, the leaves more deeply notched, and the orange-red fruits more profusely produced.

The variety **ROYALI** is almost identical with **lalandi** except in hardiness. It is said to withstand a temperature twenty degrees below zero.

|            |    |             |     |            |
|------------|----|-------------|-----|------------|
| PACHISTIMA | -- | PACHYSANDRA | --- | PYRACANTHA |
|------------|----|-------------|-----|------------|

The Genus *PIERIS* is recognized thus

twigs rather slender, 3-sided becoming terete; leaves alternate, simple, short-petioled, entire and revolute or serrulate; leaf scars small, half-round or triangular, somewhat raised, with one bundle trace and no stipule scars; buds small, ovoid to conical, with 2-5 outer scales; end-bud lacking; flowers in terminal panicles, 5-merous; fruit a small, globose or urn-shaped dehiscent capsule.

| species    | branchlets    | flower-clusters | inflorescence   | leaves                    |
|------------|---------------|-----------------|---|---------------------------|
| floribunda | bristly-hairy | upright         | terminal panicles   | acute, obtuse at the base |
| japonica   | glabrous      | drooping        | terminal panicles   | acute, obtuse at the base |
| mariana *  | glabrous      | nodding         | axillary fascicles forming<br>terminal leafless racemes<br>(racemose fascicles) | obtuse, base cuneate      |

\* syn. *Lyonia mariana*

*PIERIS*

The Genus RHODODENDRON is recognized thus

shrubs, rarely trees; buds with overlapping scales; leaves evergreen, alternate, large, petiolate, entire; flowers colorful, in terminal, umbel-like clusters or racemes, sometimes solitary or few; rarely from lateral buds, pedicelled; calyx usually 5-parted; corolla a little irregular, 5-parted or more; stamens 5-10, anthers opening at the tip; capsule ovoid to oblong, opening between the cells; seeds minute, numerous.

Rhododendrons are so numerously hybridized as to be embarrassing to the student. To give a record that would be anywhere near complete is manifestly impossible in the scope of this key, nor we do consider it desirable at this time. Only the more important hardy native species available for landscape use are here given.

As distinguished from Azaleas, the Rhododendrons have leathery, persistent leaves, 10 stamens rarely projecting beyond the corolla; leaves alternate, simple, entire; plant unarmed.

RHODODENDRON -- leaves evergreen, leathery, persistent; corolla campanulate; stamens and style rarely exerted.  
AZALEA ..... Leaves deciduous, glandular mucronate; corolla funnelform; stamens and style more or less exerted.

| species     | foliage   | leaf tip | pedicels    | leaves  |
|-------------|-----------|----------|-------------|---|
| maximum     | evergreen | acute    | viscid      | acute, 4-10" long, thinly scurfy-tomentose, rarely glabrous     |
| catawbiense | evergreen | rounded  | rusty-downy | obtuse or obtusish, 3-5" long, glabrous, pale on the under side |

VINCA MINOR is distinguished thus

an evergreen, trailing subshrub, rooting at the nodes; leaves opposite, 4-ranked, ovate, lobed on the immature growth, entire, stipulate, dark green, the veins whitening effectively in winter; flowers violet-blue, the corolla salverform; stamens fastened to the middle of the corolla tube; fruit of two dehiscent, cylindric follicles.

RHODODENDRON -- VINCA

# CONIFER GENERA

| Genus                        | character | leaf arrangement                | leaves  | leaf blade                           | leaf base                 | branchlets   | winter buds                             | fruits                               |
|------------------------------|-----------|---------------------------------|---|--------------------------------------|---------------------------|--|---|--------------------------------------|
| Taxodium<br>Bald Cypress     | deciduous | spreading in 2 ranks or rows    |   |                                      |                           |  |   |                                      |
| Larix<br>Tamarack or Larch   | "         | clustered on short spurs        |   |                                      |                           |  |   |                                      |
| Cedrus<br>Cedar              | evergreen | clustered on spurs or alternate |   | 4-sided or 4-grooved                 |                           |  |   |                                      |
| Pinus<br>Pine                | "         | not clustered on spurs          | fascicled in a membranous sheath                    | terete                               |                           |  |   |                                      |
| Picea<br>Spruce              | "         | "                               | not fascicled, scattered                            | 4-sided, stiff, sessile              | persistent, not decurrent |  |   |                                      |
| Taxus<br>Yew                 | "         | "                               | not fascicled, appearing 2-ranked by twist in stalk | flattened, stomata on upper side     | decurrent                 |  | greenish not scaly                      |                                      |
| Tsuga<br>Hemlock             | "         | "                               | appearing 2-ranked, not soft                        | flattened, petiolate, stomata above  | not decurrent             | with prominent leaf cushions or blackish             | yellowish or blackish                   |                                      |
| Pseudotsuga<br>Douglas Fir   | "         | "                               | appearing 2-ranked, soft & flexible                 | "                                    | "                         | smooth, with oval leaf scars                         | pointed, not resinous                   |                                      |
| Abies<br>Fir                 | "         | "                               | "   | flattened, sessile, stomata above    | "                         | "  | obtuse, resinous                        |                                      |
| Sciadopitys<br>Umbrella Pine | "         | whorled at end of branches      |   | deeply grooved both sides            |                           |  |   |                                      |
| Chamaecyparis<br>Retinospora | "         | opposite or whorled, in 4 rows  | usually scale-like                                  | with white markings on under side    |                           | a little flat, compressed                            |   | with 2-3 seeds under each cone scale |
| Thuja<br>Arborvitae          | "         | "                               | "   | as above & glandular                 |                           | very flat, in one plane                              | not as above                            |                                      |
| Cupressus<br>Cypress         | "         | "                               | usually scale-like and minutely toothed             | with white markings on under side    |                           | round or square, more or less in one plane, fan-like | with 4 or more seeds to each cone scale |                                      |
| Juniperus<br>Juniper         | "         | "                               | awl-like or scalelike                               | with white markings on upper surface |                           | round or square, not in one plane, not fanlike       |   | a berry                              |

The Genus *ABIES* is distinguished thus

Leaves scattered, sessile, linear, flat and grooved or quadrangular, and appearing 2-ranked; leaf base not persistent; winter buds obtuse and resinous.

| species      | leaves            | color                 | branchlets                           | buds                 | cone bracts            | bark   | resin ducts |
|--------------|-------------------|-----------------------|--------------------------------------|----------------------|------------------------|--------|-------------|
| homolepis    | pointed and rigid | lustrous, green       | grayish, glabrous, deeply grooved    |                      |                        | scaly  | internal    |
| veitchii     | "                 | "                     | not grooved, densely brown pubescent |                      |                        | smooth | marginal    |
| concolor     | blunt             | glaucous or pale blue | pubescent, yellow-green              | resinous             |                        |        |             |
| fraseri      | "                 | lustrous, green       | red, densely pubescent               | small, very resinous | exserted               |        |             |
| balsamea     | "                 | "                     | ashy-gray, pubescent                 | "                    | not exserted, reflexed |        |             |
| cilicica     | "                 | "                     | "                                    | small, not resinous  | hidden                 |        |             |
| nordmanniana | "                 | "                     | "                                    | "                    | exserted and reflexed  |        |             |

N.B. - All *ABIES* on this list are without bands of stomata on the upper side of the leaves, and have sub-globose winter buds with imbricate scales.

*ABIES*



The Genus CEDRUS may be recognized thus

Leaves alternate or clustered on short spurs; in fascicles of 2-5 surounded at the base by a sheath of scarious scales; needle-leaves angled or quadrangular in section.

| species   | leading shoot and branchlets | cones                    | branchlets                     |
|-----------|------------------------------|--------------------------|--------------------------------|
| deodara   | pendulous                    | rounded at apex          | pubescent, densely so          |
| atlantica | upright or nodding           | apex truncate or concave | densely short-pubescent        |
| libani    | "                            | "                        | glabrous or scarcely pubescent |

The Genus CHAMAECYPARIS is recognized thus

leaves opposite or whorled, usually scale-like and minutely denticulate; cones maturing the second year, with four or more seeds to each bract; branchlets a little flattened or angular (nearly square); internodes about square, glandular.

| species      | branchlets          | under side of leaves         | glands                        | relative size of leaves  | leaf tip | staminate flowers | foliage color                         |
|--------------|---------------------|------------------------------|-------------------------------|--------------------------|----------|-------------------|---------------------------------------|
| nootkatensis | nearly quadrangular | without white markings       | usually lacking               | lateral and facial equal |          |                   |                                       |
| pisifera     | flattened           | with white markings          | obscure                       | "                        |          |                   |                                       |
| thyoides     | "                   | "                            | conspicuous on back of leaves | "                        |          |                   |                                       |
| obtusa       | "                   | "                            | not glandular                 | lateral ones larger      | obtuse   | yellow            | lustrous dark green                   |
| lawsoniana   | "                   | " (but sometimes indistinct) | conspicuous on back of leaves | "                        | acutish  | red               | bright green or more or less glaucous |

CRYPTOMERIA JAPONICA is recognized thus

a pyramidal tree with spreading and upcurving branches; bark red-brown, peeling in long strips much like a Cedar or a Cypress; buds minute; leaves linear-awl-shaped, flattened laterally, keeled both faces, bright green, decurrent, directed forward and curved in, in 5 ranks; flowers moncecious, staminate cones in terminal racemes, pistillate cones solitary and globose at the ends of short lateral branchlets, brown, ripening the first year, persistent; cone-scales wedge-shaped.

The Genus CUPRESSUS is recognized thus

foliage fragrant; bark shredding; branchlets quadrangular or terete; leaves opposite, small, scale-like, appressed; cones globular, each cone-scale with numerous seeds.

| species      | branches            | lower bark   | leaves  |
|--------------|---------------------|--|---|
| sempervirens | erect or horizontal | thin, gray, smooth or slightly longitudinally fissured               | ovate, glandular  |
| macrocarpa   | horizontal          | ridged, dark reddish-brown, separating into thick, persistent scales | rhombic-ovate, not or obscurely glandular, swollen toward tip |

CRYPTOMERIA --- CUPRESSUS

The Genus JUNIPERUS is recognized thus

leaves opposite or whorled, alternating in pairs at right angles, linear or scale-like, often both kinds on the same plant, acute, with 2 glaucous or whitish lines on the upper side and green beneath; fruit berry-like.

| species      | leaves                         | glands  | upper side of leaves | leaf base | staminate flowers | branch-lets | leaf tip                  | fruit                                    | form                      | habit   | color      |
|--------------|--------------------------------|---------|----------------------|-----------|-------------------|-------------|---------------------------|--|---------------------------|---|------------|
| communis     | always needle-shaped & in 3's  | absent  | with one white line  | jointed   | axillary          |             |                           | dark blue                                |                           |   |            |
| macrocarpa   | "                              | "       | with two white lines | "         | "                 |             |                           | dark brown, glaucous 1-seeded, red-brown |                           |   |            |
| squamata     | "                              | "       | "                    | decurrent | terminal          | green       |                           |  |                           |   |            |
| chinensis    | of 2 kinds, opposite or in 3's | present | "                    | "         | "                 |             | scale-like, leaves obtuse | 2-3 seeded brown, bloomy                 |                           |   |            |
| excelsa      | " margin entire                | "       | "                    | "         | "                 |             | acute                     | brown, 3-6 seeded                        |                           |   |            |
| virginiana   | "                              | "       | "                    | "         | "                 |             | acute or acuminate        | blue, bloomy, erect                      | upright or spreading tree |   |            |
| horizontalis | "                              | "       | "                    | "         | "                 | green       | "                         | blue, bloomy, pendulous                  | shrub                     | prostrate                                     | blue-green |
| sabina       | "                              | "       | "                    | "         | "                 |             | obtusish                  | "  | "                         | ascending or spreading, odor bad when bruised | dark green |

# JUNIPERUS

The Genus LARIX is recognized thus

tree with one main trunk through to the top, bark scaly; needle-leaves soft, deciduous, clustered on short spurs; fruit an ellipsoid cone with thinish scales.

WINTER : branches often drooping; branchlets with short lateral spurs on which are found the leaf scars; leaf scars alternate, raised,  $\frac{1}{2}$ -round or triangular, minute, clustered on the short lateral spurs, with one bundle trace and no stipule scars; buds solitary, sessile, small, globose or short-ovoid, with many brown scales which are sometimes slender-pointed.

# Summer and Winter Keys combined

| species                  | bracts                   | under side of leaves            | cones   | cone scales                             | branchlets |
|--------------------------|--------------------------|---------------------------------|---------|---|------------|
| occidentalis             | exceeding scales of cone |                                 |         |   |            |
| leptolepis               | shorter than scales      | with two white bands            |         |   |            |
| europaea                 | "                        | without conspicuous white bands | erect   | not incurved at apex, pubescent on back | glabrous   |
| laricina                 | "                        | "                               | pendant | glabrous, striate, lustrous             | "          |
| dahurica<br>syn. Gmelini | "                        | "                               |         | "                                       | pubescent  |

The Genus LIBOCEDRUS is recognized thus

Aromatic trees with the branchlets densely clothed with small, appressed, scale-like leaves; leaves 4-angled or terete, rarely flattened, opposite, minutely denticulate and ciliate, possibly awl-shaped and spreading on very young plants; cones globose or nearly so, ripening the 2nd season, with up to 12 woody, shield-shaped scales, each scale with numerous flattish, narrowly winged seeds.

LARIX -- LIBOCEDRUS

The Genus PICEA is recognized thus  
 leaves scattered, needle-shaped, four-sided, and stomatiferous on all four sides; branchlets with prominent leaf cushions separated by incised grooves and produced at the apex into a peg-like stalk (pulvinus) to which the leaf is attached.

| species                | leaf form     | stomata                 | branchlets                                      | terminal winter-buds                  | cones                             | leaf position                    | leaves  | bud scales                               |
|------------------------|---------------|-------------------------|---|---------------------------------------|-----------------------------------|----------------------------------|---|--|
| Jezoensis              | flattened     | white bands above only  | glabrous shining                                |                                       | scale margins minutely jagged     |                                  | not pungent   |  |
| omorika                | "             | "                       | pubescent                                       | with awl-shaped scales at the base    | finely denticulate                |                                  | with a distinct green midrib                            |  |
| mariana                | quadran-gular | lines on all four sides | pubescent, glandular                            | "                                     | scales flexible, margins jagged   |                                  |   |  |
| orientalis             | "             | "                       | pubescent                                       | without awl-shaped scales at the base | scales stiff                      |                                  | lustrous dark green, very short, obtuse odor strong     |  |
| engelmanni             | "             | "                       | "   | " and not resinous                    | scales flexible rhombic           |                                  | glaucous, blue-green, 3-1" odor strong                  |  |
| excelsa syn. - abies   | "             | "                       | almost glabrous, pubescence minute or scattered | not resinous                          | very long 2 1/2-7"                | pointing forward                 | lustrous deep green                                     |  |
| canadensis syn. glauca | "             | "                       | glabrous  | resinous                              | short (2" or less) easily crushed | "                                | glaucous, flexible, soft; incurved; strong-smelling     | rounded, emarginate, tip scales revolute |
| polita                 | "             | "                       | "   | not resinous, dark brown              |                                   | spreading at nearly right angles | lustrous dark green, apex very sharp pulvini very large | firmly appressed, dark brown             |
| pungens                | "             | "                       | "   | not resinous, light yellow-brown      |                                   | "                                | pointed, blue-green                                     | revolute at apex, light brown            |



The Genus PINUS is recognized thus  
needle-leaves in clusters surrounded at the base by sheaths of bud scales.

| species            | leaves in a cluster | sheaths    | needles                                       | branchlets   | winter buds                     | cones   | cone scales                     | twigs                | upper bark                   | size of sheaths |
|--------------------|---------------------|------------|---|--|---------------------------------|---|---------------------------------|----------------------|------------------------------|-----------------|
| flexilis           | five                | deciduous  | slender margin entire                         | puberulous   |                                 | dehiscent, seeds wingless                         |                                 |                      |                              |                 |
| cembra             | "                   | "          | margin serrulate                              | densely brown tomentose                                |                                 | seeds winged                                      |                                 |                      |                              |                 |
| excelsa syn. peuce | "                   | "          | slender 6-8" serrulate, pendulous             | glabrous   |                                 | "   |                                 | glaucous             |                              |                 |
| strobilus          | "                   | "          | thip, soft, 2-5" serrulate                    | puberulous at first, soon glabrous                     |                                 | "   |                                 | not glaucous         |                              |                 |
| bungeana           | 1-4 usually 3       | "          | 2-5" rigid, serrulate                         | "  |                                 | "   |                                 |                      | chalky-white                 |                 |
| jeffreyi           | usually three       | persistent | long, stiff, straight, blue-green             | bloomy   | blue-green, not resinous        | deciduous   |                                 |                      |                              |                 |
| ponderosa          | "                   | "          | long, 5-11" stout, bright green, back rounded | orange-brown, not bloomy, scales appressed when broken | resinous, scales appressed      | deciduous, prickly sub-terminal                   |                                 |                      | orange, with odor of vanilla |                 |
| rigida             | "                   | "          | long 3-7" stout, dark green, back flat        | light brown not bloomy                                 | scale tips spreading            | tenaciously persistent, symmetrical, not prickly  |                                 |                      |                              |                 |
| virginiana         | two                 | "          |   | glaucous   | very resinous, scales appressed | symmetrical, prickly                              |                                 |                      |                              |                 |
| banksiana          | "                   | "          | stout, twisted                                | not glaucous   | resinous                        | tenaciously persistent, asymmetrical, not prickly |                                 | orange               |                              |                 |
| sylvestris         | "                   | "          | stout, twisted                                | "  | "                               | deciduous, short stalked                          | umbo small obtuse               | dull greenish yellow | bright orange, peeling       |                 |
| montana syn. mugo  | "                   | "          | "   | "  | "                               | deciduous, sub-sessile                            | prickly light gray marked black | "                    | dark brownish                |                 |
| resinosa           | "                   | "          | not twisted, lustrous                         | "  | "                               | deciduous   |                                 | orange               | reddish                      | 4/5"            |
| nigra              | "                   | "          | not twisted, dull                             | "  | "                               | "   |                                 | yellow-green         | reddish                      | 3/4"            |

PINUS

The Genus *PSEUDOTSUGA* is recognized thus  
buds not resinous, pointed; needle-leaves soft and flexible, linear, flattened, spirally arranged but spreading in two opposite rows; branches marked by oval scars where leaves have fallen; fruit a cone.

The Genus *TAXODIUM* is recognized thus  
bark furrowed and scaly; branchlets of two kinds, persistent and with axillary buds or deciduous and without axillary buds; leaves alternate, flat, short, 2-ranked on the deciduous branchlets; fruit a globose, short-stalked cone.

The Genus *TAXUS* is recognized thus  
leaves linear, often curved and scythe-shaped, petiolate, spreading in 2 ranks, very dark green with two broad yellowish bands on the under side; branches irregularly alternate; fruit a bony nutlet surrounded or almost enclosed by a cup-shaped, fleshy, scarlet disk.

| species    | bud scales            | leaves                 | midrib          | color                           | foliage                |
|------------|-----------------------|------------------------|-----------------|---------------------------------|------------------------|
| baccata    | obtuse,<br>not keeled | gradually<br>acuminate |                 |                                 |                        |
| cuspidata  | acute,<br>keeled      | abruptly<br>pointed    | pointed above   | very dark<br>green              | broad                  |
| canadensis | "                     | "                      | slightly raised | lighter green,<br>turning brown | less broad,<br>slender |

The Genus *SEQUIA* is recognized thus  
a tall, evergreen tree, often exceptionally large and of very great age; bark thick, red-brown, fibrous, deeply furrowed and ridged; leaves alternate, persistent, solitary, scattered, linear to lanceolate, with 2 white stomatic lines on the under side, petiolate; also with scale-like leaves spirally arranged; branchlets all persistent; fruit a cone, woody, persistent, with divergent scales spirally arranged, widened at the top and with a depressed center, wrinkled, without distinct bracts, with 6-9 flattened seeds; winter buds scaly.

*PSEUDOTSUGA*    --    *TAXODIUM*    --    *TAXUS*    --    *SEQUIA*

The Genus THUJA is recognized thus

branchlets disposed in one plane, flattened; leaves scalelike, in pairs alternate at right angles, the lateral leaves nearly covering the facial ones; fruit a cone, ovoid-oblong or ovoid.

| species      | branchlets          | cone scales                    | seeds    | leaves   | glands  | leaf apex |
|--------------|---------------------|--------------------------------|----------|--|---------|-----------|
| orientalis   | in vertical planes  | thick                          | wingless |  |         |           |
| occidentalis | planes not vertical | thin                           | winged   | yellow-green beneath and with a gland with triangular white markings |         |           |
| koraiensis   | "                   | "                              | "        |  | present |           |
| plicata      | "                   | thin, fertile scales usually 6 | "        | "  | absent  | acute     |
| standishi    | "                   | thin, fertile scales usually 4 | "        | "  | "       | obtuse    |

The Genus TSUGA is recognized thus

branchlets with prominent leaf cushions; buds globose or ovoid, not resinous; leaves spirally arranged but appearing 2-ranked by reason of a twist in the petiole, linear, flattened and grooved above, and with 2 whitish bands of stomata on the under side; fruit a small cone of concave woody scales.

| species     | leaves                           | branchlets |
|-------------|----------------------------------|------------|
| caroliniana | margin entire                    | pubescent  |
| canadensis  | margin denticulate near the apex | "          |

THUJA -- TSUGA

## GLOSSARY

- achene - a small, dry, hard, -1-celled, 1-seeded, fruit, indehiscent
- acorn - a 1-celled, 1-seeded nut, fixed in a woody cup or involucre
- acuminate - tapering at the end
- acute - terminating in a sharp or well-defined angle
- adventitious - imperfectly naturalized, as roots growing from internodes as well as nodes
- aggregate - a collection or collected mass
- alternate - (of leaves, etc.) arranged singly, at different points, not opposite
- ament - a catkin or scaly spike
- anastomosing - the ends of the veins curved to connect with the vein ahead, and by cross-veins forming a network
- annual - of one year's growth or duration
- anther - the tip of the stamen containing pollen
- apetalous - having no petals
- apiculate - ending in a short, pointed tip
- appressed - lying close and flat against
- armed - with spines or prickles
- articular - with a joint
- articulate - having a joint or node; jointed
- ascending - rising somewhat obliquely or curving upward
- astringent - having the power to contract or draw together organic tissues
- attenuate - slenderly tapering; becoming very narrow
- auricle - an ear-shaped appendage
- auriculate - ear-shaped
- awl-shaped - tapering upward from the base to a slender or rigid point
- awn - a bristle-shaped appendage
- axil - the angle formed by a leaf or branch with the stem
- axillary - situated in an axil
- bast - the fibrous portion of the inner bark
- beaked - ending in a prolonged tip
- bearded - bearing a long awn, or furnished with long or stiff hairs
- berry - a fruit with the seeds embedded in a fleshy pulp which represents the entire pericarp except the outer layer or skin, as the tomato, grape, and currant.
- bi or bis- - a Latin prefix signifying two, twice, or doubly
- biennial - of two years duration
- bilabiate - two-lipped
- bipinnate - doubly or twice pinnate

bivalvular - with two valves  
 blade - the expanded portion of a leaf, etc.  
 bract - a more or less modified leaf subtending a flower or belonging to an inflorescence, or sometimes belonging to the stem  
 bractlet - a secondary bract, as one upon the pedicel of a flower  
 bristles - coarse, stiff hairs  
 bristly - having or resembling bristles  
 bud - the rudimentary state of a stem or branch; an unexpanded flower  
 budding - the act of setting a bud of one tree in contact with the cambium of another for purposes of propagation  
 bulb - an underground leaf bud with fleshy scales or coats  
 bulbous - having the character of a bulb  
 bundle-trace - the tiny marks upon leaf scars representing the ends of the vascular bundles which penetrated the leaf and carried water and minerals to the leaf cells.  
 caducous - falling off early  
 calcareous - composed of, containing, or of the nature of lime or limestone  
 callus - a hard protuberance or callosity  
 calyx - the outer perianth of the flower  
 campanulate - bell-shaped; cup-shaped with a broad base  
 canescent - hoary with gray pubescence  
 capsular - belonging to or of the nature of a capsule  
 capsule - a dry, dehiscent fruit composed of more than one carpel  
 carpel - a simple pistil or one member of a compound pistil  
 catkin - an ament or a deciduous scaly spike of asexual, apetalous flowers  
 chaff - a small, thin scale or bract, becoming dry and membranous  
 chambered - (of the pith) having hollows or cavities  
 ciliate - marginally fringed with hairs  
 coalescence - the union of parts or organs of the same kind  
 collateral - subordinately connected; secondary  
 compound - composed of two or more similar parts united into one whole.  
     compound leaf - one divided into separate leaflets  
 compressed - flattened, especially laterally  
 conduplicate - folded together lengthwise  
 cone - a dry, multiple fruit composed of a dense aggregation of scales arranged symmetrically around an elongated axis, and bearing seeds on the upper side  
 confluent - running into each other; blended into one  
 coniferous - cone-bearing  
 conglomerate - a mass or collection of material



conical - shaped like a cone  
 connate - united; used especially of like structures joined from the start  
 connivent - coming into contact; converging  
 convolute - rolled up longitudinally  
 cordate - heart-shaped with the point upward  
 coriaceous - leathery in texture  
 corm - enlarged fleshy base of a stem, bulb-like but solid  
 corolla - the inner perianth; composed of petals  
 corrugated - wrinkled or in folds  
 corymb - a flat-topped or convex open flower cluster; in the stricter use of the word equivalent to a contracted raceme and progressing in its flowering from the margin inward  
 corymbose - in corymbs or corymb-like  
 crenate - dentate with the teeth much rounded  
 crenulate - finely crenate  
 cucullate - hooded or hood-shaped; cowled  
 cuneate - wedge-shaped; triangular with the acute angle downward  
 cuspidate - tipped with a sharp and rigid point  
 cyme - a broad and flattish determinate inflorescence, i.e. with its central or terminal flowers blooming earliest  
 cymose - bearing cymes or cyme-like  
 deciduous - not persistent; not evergreen  
 decurrent (leaf) - extending down the stem below the insertion  
 dehiscent - opening regularly by valves or slits, etc. as a capsule or anther  
 deltoid - triangular; like an equilateral triangle  
 dentate - toothed, usually with the teeth directed outward  
 denticulate - minutely dentate  
 depressed somewhat flattened from above  
 di-, dis- - a Greek prefix signifying two or twice  
 diadelphous (stamens) - combined in two sets  
 diaphragms - dividing membranes or partitions  
 diffuse - widely or loosely spreading  
 dioecious - of two households; unisexual, with two kinds of flowers on separate plants  
 disc (disk) - a development of the receptacle at or around the base of the pistil  
 dissected cut or divided into numerous segments

distinctious - in two vertical ranks

distinct - separate; not united; evident

divaricate - widely divergent

divided - lobed to the base

dorsal - on or related to the back or outer surface of an organ

drupe - a fleshy or pulpy fruit with the inner portion of the pericarp hard  
or stony, one-celled and one-seeded, viz. plum

drupelet - a diminutive drupe

e- or ex- - a Latin prefix meaning without

ecology - concerning the relation of plants to their surroundings

ellipsoid - oblong with rounded ends

elliptic - of or pertaining to or shaped like an ellipse

emarginate - having a shallow notch at the extremity

endogenous - growing throughout the substance of a stem instead of by  
superficial layers

entire - without toothing or division

erose - as if gnawed

exfoliating - cleaving off in thin layers

exotic - foreign; not native; appearing as if belonging to another part of the  
world

exserted - projecting beyond an envelope, as stamens from a corolla

falcate - scythe-shaped; curved and flat, tapering gradually

fascicle - a close bundle or cluster

fastigate (branches) - erect and near together; columnar

fibrous - composed of or resembling fibers

filament - the part of the stamen which supports the anther

filiform - thread-shaped

fimbriate - fringed

fissured - cracked or split

flaking - breaking off in small, flat fragments or scales

flaky - easily separable into flakes

flexible - capable of being bent

flexuous - zigzag, bending alternately in opposite directions

foliaceous - leaflike in texture or appearance

foliate - having leaves

foliolate - having leaflets

forked - divided into nearly equal branches

fluted - showing parallel grooves

fruit - the seed-bearing product of a plant

fusiform - spindle-shaped; swollen in the middle and narrowing toward each end

gibbous - protuberant or swollen on one side

glabrate - somewhat glabrous or becoming glabrous

glabrescent - inclined to be glabrous

glabrous - smooth; not rough, pubescent, or hairy

gland - a secreting surface or structure; any protuberance or appendage having the appearance of such an organ

glandular - bearing glands or of the nature of a gland

glaucous - covered or whitened with a bloom (wild yeast)

glazed - smooth and shining; glassy

globose - globe-like; nearly globular

glutinous - sticky

gnarled - distorted, knotty; twisted and cross-grained

grafting - the process of propagation by inserting a scion into a tree

habit - the general appearance of a plant

hastate - like an arrow-head

head - a dense cluster of sessile or nearly sessile flowers on a very short axis or receptacle

hispid - beset with rigid or bristly hairs or with bristles

hoary - grayish-white with a fine, close pubescence

hybrid - a cross-breed of two species

humus - decayed vegetable matter in the soil

husk - the outer covering of fruits or seeds

imbricate - overlapping, either vertically or spirally

impressed - bent inward; hollowed or furrowed as if by pressure

incised - cut sharply and irregularly, more or less deeply

indefinite - inconstant in number or very numerous

indehiscent - not opening by valves, etc; remaining persistently closed

inflated - bladdery; puffed out

inflorescence - the flowering part of a plant, and especially the mode of its arrangement

inserted - attached to or growing out of

inter- or intra- - between

internode - the portion of a stem between two nodes or growing points

introduced - brought intentionally from another region, as for purposes of cultivation  
 involucre - a circle or collection of bracts surrounding a flower cluster or head, or a single flower  
 irregular - showing inequality in size, form, or union  
 keel - a central dorsal ridge, like the keel of a boat  
 keeled - having a keel or ridge  
 labiate - lipped  
 lacinate - slashed; cut into narrow, pointed lobes  
 lanceolate - shaped like a lance-head; several times longer than wide, broadest above the base and narrowed to the apex  
 lateral - pertaining to, directed from, or directed toward the side  
 leaflet - a single division of a compound leaf  
 legume - the fruit of the Leguminosae, formed of a single pistil and usually splitting open by both sutures; bean-like  
 leguminous - pertaining to a legume or to the Leguminosae  
 lenticel - breathing pore of leaf or stem  
 lenticular - lentil-shaped; of the shape of a double convex lens; having lenticels  
 limb - the expanded portion of any leaf or petal; a branch of a tree growing out from the trunk  
 linear - long and narrow, with parallel margins  
 lobe - any segment of an organ, especially if rounded  
 lobed - divided into or bearing lobes  
 median - pertaining to the middle  
 membrane - a thin, sheetlike structure connecting other structures or serving to cover or line some part or organ  
 membranous - thin, rather soft and more or less translucent tissue; pertaining to a membrane  
 -merous - in composition, having parts, as 2-merous, having two parts of each kind  
 midrib - the central or main vein of a leaf  
 monodelphous (stamens) - united by their filaments into a tube or column  
 monoecious - with stamens and pistils in separate flowers on the same plant; of one household  
 mucilaginous - adhesive or slimy with vegetable gum  
 mucronate - tipped with a short and small abrupt tip; spiny-tipped (veins)  
 mucronulate - with a minute spiny tip; inclined to be mucronate  
 multiple - containing or consisting of more than one  
 nerve - a simple or unbranched vein or slender rib  
 netted (veination) - meshed like a net  
 node - growing points along the stem; the place along the stem which normally bears a leaf or leaves  
 nut - a hard indehiscent 1-celled and 1-seeded fruit, though usually resulting from a compound ovary

nutlet - a diminutive nut

ob- - a Latin prefix, usually carrying the idea of inversion

obcordate - inverted heart-shaped

oblanceolate - lanceolate with the broadest part near the apex

oblique - unequal sided, lop-sided, or slanting

oblong - longer than broad and with nearly parallel sides

obovate - inverted ovate

obovoid - having the form of an inverted egg

obtuse - blunt or rounded at the end

opaque - dull, neither shining nor translucent; impervious to light

opposite - arranged in pairs

orbicular - circular

ovate - egg-shaped, broadest near the base

ovoid - with an oval outline

palmate - radially lobed or divided

panicle - a loose, irregularly compound inflorescence with pedicelled flowers

panicled, paniculate - borne in a panicle; resembling a panicle

papilionaceous - (corolla) having a standard, wings, and a keel, as in a  
pea- or bean-blossom

papillose - bearing minute, nipple-shaped projections

pappus - the modified calyx limb in Compositae, forming a crown of very various  
character at the summit of the achene

parted - cleft nearly but not quite to the base

pedicel - the support of a single flower

peduncle - a primary flower-stalk, supporting either a cluster or a solitary  
flower

pedunculate - borne upon a peduncle

pellucid - clear, transparent

peltate - shield-shaped and attached to the support by the lower surface

pendulous - more or less hanging or declined

perennial - lasting year after year

perfect - (flower) having both pistil and stamens

perianth - the floral envelope, consisting of calyx and corolla

persistent - long continuous, as a calyx upon the fruit, leaves through the  
winter, etc.

petal - a division of the corolla

petaloid - colored like and resembling a petal

petiolate - having a petiole



petiole - the stem of a leaf

pilose - hairy, especially with soft hairs

pinnate (leaf) - compound with the leaflets arranged on each side of a  
common petiole

pinnatifid - pinnately cleft

pistil - the seed-bearing organ of a flower, consisting of the ovary, stigma  
and style when present

pistillate - provided with pistils, and in its more proper sense without stamens

pitted - marked with small depressions or pits

plicate folded into plaits, usually lengthwise

plumose - having fine hairs on each side, like the barbs of a feather

pod - any dry and dehiscent fruit

pollen - the fecundating grains contained in the anther

polliniferous - bearing pollen

pome - a fleshy fruit with the seeds contained in a stiff-walled cells like  
the apple

porous - pierced with many small holes or pores

prickle - a small spine, or more or less slender, sharp outgrowth from the  
bark or rind

procumbent - lying on the ground or trailing but without rooting at the nodes

prostrate - lying flat on the ground

puberulent - minutely pubescent; inclined to be pubescent

pubescent - covered with hairs, especially if short, soft, and downlike

pulvinus (i) - an enlargement or protuberance at the base or insertion of a leaf

punctate - dotted with depressions, or with translucent internal glands or  
colored dots

pungent - having power to affect the nerves of sensation, as by pricking,  
stinging or piercing; acrid

pyriform - pear-shaped

raceme - a simple inflorescence of pedicelled flowers upon a common more or less  
elongated axis

racemose - in racemes or resembling racemes

rachis - the axis of a spike or of a compound leaf

radiate - spreading from or arranged around a common center

receptacle - the expanded portion of an axis bearing the organs, as pistil and  
stamens

recurved - curved downward or backward

reflexed - abruptly bent or turned downward

regular - uniform in shape or structure

reniform - kidney-shaped

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reniform - kidney-shaped

repand - with a slightly uneven and somewhat sinuate margin

resinous - with resin

reticulate - net-veined

retuse - with a shallow notch at a rounded apex

revolute - rolled backward from the margins or apex

rhachis - see rachis

rib - a primary or prominent vein of a leaf

rotate - wheel-shaped

rufous - see rufus

rufus - reddish-brown

rugged - having a surface full of abrupt inequalities; rough; uneven

rugose - wrinkled

salver-shaped - (corolla) having a slender tube abruptly expanded into a flat limb

samara - an indehiscent winged fruit

scabrous - rough to the touch

scarious - thin, dry, and membranaceous, not green

scurfy - with exfoliated skin thrown off in minute scales

segment - one of the parts of leaf or other like organ that is cleft or divided

sepal - a division of the calyx

serrate - having sharp teeth pointing forward

serrulate - finely serrate

sessile - without footstalk of any kind

setose - beset with bristles

sheath - a tubular envelope

silky - covered with close-pressed, soft, and straight pubescence

simple - of one piece, not compound

sinuous - curving in and out

sinuate - with the outline of the margin strongly wavy

sinus - the cleft or recess between two lobes

smooth - without roughness or pubescence

spike - a form of simple inflorescence with the flowers sessile or nearly so upon a more or less elongated common axis

spine - a sharp woody or rigid outgrowth from the stem

spinescent - spine-like or having spines



translucent - allowing some passage of light so that objects may be partly  
evident but not clearly visible

trifoliate - with three leaflets

truncate - ending abruptly as if cut off transversely

tuber - a thickened and short underground branch having numerous buds or eyes

tubercle - a small tuber or tuber-like body, usually subterranean

turbinate - top-shaped

umbel - an inflorescence in which the peduncles or pedicels of a cluster  
spring from the same point

umbellate - in or like an umbel

undulate - with a wavy surface

uni- - in composition, one

unisexual - of one sex, either staminate or pistillate only

urceolate - urn-shaped

valvate - opening by valves, as a capsule; or meeting by the edges without  
overlapping

valve - one of the pieces into which a capsule splits

valvular - having valves

velutinous - velvety

ventral - on or relating to the front or inner surface of an organ

verruucose - covered with wart-like projections

villous - bearing long and soft hairs

viscid - glutinous, sticky

whorl - an arrangement of leaves in a circle around the stem

whorled - with three or more leaves, buds, scars, or twigs in a circle  
around the stem

wing - any membranous or thin expansion bordering or surrounding an organ;  
the lateral petal of a papilionaceous corolla

woolly - clothed with long and tortuous or matted hairs

# NOMENCLATURE

## Deciduous Trees

*Acanthopanax ricinifolium* (Seem.) - Castor Aralia. syn. *Kalopanax pictus*  
*Acer campestre* (Linn.) - Hedge or Field Maple  
*Acer dasycarpum* (Ehrh.) - Silver or Soft Maple. syn. *Acer saccharinum*  
*Acer japonicum* (Thunb.) - Japanese or Full-Moon Maple  
*Acer negundo* (Linn.) - Box Elder  
*Acer nigrum* (Michx.) - Black Maple  
*Acer palmatum* (Thunb.) - Japanese Maple, Palmate-leaved Maple  
*Acer pennsylvanicum* (Linn.) - Moosewood, Striped or Goosefoot Maple  
*Acer platanoides* (Linn.) - Norway Maple  
*Acer pseudoplatanus* (Linn.) - Sycamore Maple  
*Acer rubrum* (Linn.) Red Maple, Scarlet Maple  
*Acer saccharinum* (Linn.) - Silver Maple . syn. *Acer dasycarpum*  
*Acer saccharum* (Marsh.) - Sugar Maple, Hard Maple  
*Acer spicatum* (Lam.) - Mountain Maple  
*Aesculus glabra* (Willd.) - Ohio Buckeye  
*Aesculus hippocastanum* (Linn.) - Horsechestnut  
*Ailanthus altissima* (Mill.) -Stinking Chun, Tree of Heaven. syn. *A.glandulosa*  
*Ailanthus glandulosa* (Desf.) - Tree of Heaven, Ash-can Tree. syn. *A.altissima*  
*Alnus glutinosa* (Gaertn.) - Black or European Alder  
*Alnus incana* (Willd.) - Speckled or Hoary-leaved Alder  
*Amelanchier canadensis* (Med.) - Juneberry, Downy Shadblow  
*Amelanchier laevis* (Wieg.) - Shadblow, Allegheny Serviceberry  
*Asimina triloba* (Dunal.) Papaw  
*Betula alba* (Linn.) - White Birch. syn. *Betula pendula*  
*Betula lenta* (Linn.) - Cherry Birch, Sweet Birch  
*Betula lutea* (Michx.) - Yellow Birch  
*Betula nigra* (Linn.) - Red or River Birch  
*Betula papyrifera* (Marsh.) - Paper or Canoe Birch  
*Betula pendula* (Roth.) - White Birch. syn. *B.alba*  
*Betula populifolia* (Ait.) - Gray Birch, Poplar Birch  
*Carya cordiformis* (Wangh.) - Bitternut Hickory. syn. *Hicoria cordiformis*  
*Carya glabra* (Mill.) - - Pignut Hickory. syn. *Hicoria glabra*  
*Carya laciniata* (Michx.) - Kingnut or Big Shellbark Hickory. syn. *Hicoria laciniata*  
*Carya ovata* (Mill.) - Shagbark Hickory. syn. *Hicoria ovata*  
*Carya pecan* (Marsh.) - Pecan. syn. *Hicoria pecan*  
*Carya tomentosa* (Lam.) - Mockernut or White Hickory. syn. *Hicoria alba*  
*Carpinus caroliniana* (Walt.) - Blue Beech, Ironwood.  
*Castanea dentata* (Borkh.) - Chestnut  
*Castanea mollissima* (Blume.) - Chinese Chestnut  
*Catalpa bignonioides* (Walt.) - Southern Catalpa  
*Catalpa kaempferi* (Sieb. & Zucc.) - Japanese Catalpa. syn. *Catalpa ovata*  
*Catalpa speciosa* (Engelm.) - Western Catalpa  
*Catalpa ovata* (Don.) - Japanese Catalpa syn. *Catalpa Kaempferi*  
*Cedrela sinensis* (Juss.) - Chinese Cedrela  
*Celtis occidentalis* (Linn.) - Hackberry  
*Cercidiphyllum japonicum* (Sieb. & Zucc.) - Katsura tree, Cercis-leaf  
*Cercis canadensis* (Linn.) - Redbud or Judas tree  
*Gleditsia lutea* (Koch.) - Yellow-wood, Virgilina  
*Cornus alternifolia* (Linn.) - Alternate-leaved or Pagoda Dogwood  
*Cornus florida* (Linn.) - Flowering Dogwood  
*Cornus mas* (Linn.) - Cornelian Cherry  
*Crataegus coccinea* (Linn.) - Red Haw, Scarlet Thorn. syn. *Crataegus intricata*  
*Crataegus cordata* (Ait.) - Washington Thorn. syn. *Crataegus phaenopyrum*  
*Crataegus crus-galli* (Linn.) - Cockspur Thorn  
*Crataegus monogyna* (Jacq.) - English Hawthorn  
*Crataegus oxyacantha* (Linn.) - English Hawthorn White Thorn, Quickset.  
*Crataegus phaenopyrum* (L.f.) - Washington Thorn. syn. *Crataegus cordata*  
*Crataegus punctata* (Jacq.) - Dotted Hawthorn  
*Diospyros virginiana* (Linn.) - Persimmon  
*Elaeagnus angustifolia* (Linn.) - Russian Olive, Oleaster  
*Fagus americana* (Sweet.) - Beech, Silver Beech. syn. *Fagus grandifolia*  
*Fagus grandifolia* (Ehrh.) - Silver Beech. syn. *Fagus americana*  
*Fagus sylvatica* (Linn.) - European Beech



*Fraxinus americana* (Linn.) - White Ash  
*Fraxinus excelsior* (Linn.) - European Ash  
*Fraxinus lanceolata* (Borkh.) - Green Ash. syn. *Fraxinus pennsylvanica* Lanceolat  
*Fraxinus nigra* (Marsh.) - Black Ash or Hoop Ash  
*Fraxinus pennsylvanica* (Marsh.) - Red Ash  
*Fraxinus quadrangulata* (Michx.) - Blue Ash  
*Ginkgo biloba* (Linn.) - Ginkgo, Maidenhair Tree  
*Gleditsia triacanthos* (Linn.) - Honey Locust  
*Gymnocladus dioica* (Koch.) - Kentucky Coffee Tree. syn. *G. dioicus* (Linn.)  
*Halesia tetraptera* (Linn.) - Silverbell, Snowdrop tree. syn. *Halesia tetraptera*  
*Halesia tetraptera* (Ellis.) - Silverbell, Snowdrop tree. syn. *H. carolina*  
*Hicoria alba* (Brit.) - Mockernut or White Hickory. syn. *Carya tomentosa*  
*Hicoria cordiformis* (Brit.) - Bitternut Hickory. syn. *Carya cordiformis*  
*Hicoria glabra* (Brit.) - Pignut Hickory. syn. *Carya glabra*  
*Hicoria laciniosa* (Sarg.) - Kingnut or Big Shellbark Hickory. syn. *Carya lacini*  
*Hicoria ovata* (Brit.) - Shagbark Hickory. syn. *Carya ovata*  
*Hicoria pecan* (Brit.) - Pecan. syn. *Carya pecan*  
*Juglans cinerea* (Linn.) - Butternut, White Walnut  
*Juglans nigra* (Linn.) - Black Walnut  
*Juglans regia* (Linn.) - English or Persian Walnut  
*Juglans sieboldiana* (Maxim.) - Japanese Walnut, Kurume  
*Koelreuteria paniculata* (Laxm.) - Japanese Varnish Tree  
*Kalopanax pictus* (Thunb.) - Castor Aralia. syn. *Acanthopanax ricinifolium*  
*Laburnum anagyroides* (Med.) - Golden Rain tree. syn. *Laburnum vulgare*  
*Laburnum vulgare* (Griseb.) - Golden Chain tree. syn. *Laburnum anagyroides*  
*Liquidambar styraciflua* (Linn.) - Sweet Gum  
*Liriodendron tulipifera* (Linn.) - Tulip tree, Whitewood  
*Maclura pomifera* (Schneid.) - Osage Orange, Hedge Apple  
*Magnolia acuminata* (Linn.) - Cucumber Tree  
*Magnolia glauca* (Linn.) - Sweet Bay. syn. *Magnolia virginiana*  
*Magnolia soulangeana* (Soul.) - Saucer Magnolia  
*Magnolia tripetala* (Linn.) - Umbrella Magnolia  
*Magnolia virginiana* (Linn.) - Sweet Bay. syn. *Magnolia glauca*  
*Malus angustifolia* (Michx.) - Southern Crab  
*Malus arnoldiana* (Sarg.) - Arnold Crab  
*Malus baccata* (Borkh.) - Siberian Crab  
*Malus coronaria* (Mill.) - Garland Crab  
*Malus floribunda* (Sieb.) - Japanese Flowering Crab  
*Malus halliana* (Koech.) - Hall's Crab  
*Malus ioensis* (Brit.) - Prairie Crab  
*Malus sargentii* (Rehd.) - Sargent Crab  
*Malus schiedeckeri* (Zab.) - Schiedeckeri Crab  
*Malus spectabilis* (Borkh.) - Chinese Flowering Crab  
*Morus alba* (Linn.) - White Mulberry, Chinese Mulberry  
*Morus rubra* (Linn.) - Red Mulberry  
*Nyssa sylvatica* (Marsh.) - Tupelo, Pepperidge, Sour Gum  
*Ostrya virginiana* (Koch.) - Hop Hornbeam, Ironwood  
*Paulownia imperialis* (Seib. & Zucc.) - Royal Paulownia. syn. *Paulownia tomentosa*  
*Paulownia tomentosa* (Thunb.) - Royal Paulownia. syn. *P. imperialis*  
*Phellodendron amurense* (Rupr.) - Amoor Cork Tree  
*Phellodendron sachalinense* (Sarg.) - Saghalin Cork Tree  
*Platanus acerifolia* (Willd.) - London Plane Tree  
*Platanus occidentalis* (Linn.) - Sycamore, Buttonwood  
*Platanus orientalis* (Linn.) - Platan, European Plane Tree  
*Populus alba* (Linn.) - White Poplar, Abele  
*Populus deltoides* (Marsh.) - Carolina Poplar, Cottonwood  
*Populus grandidentata* (Michx.) - Coarse-toothed Poplar  
*Populus nigra* (Linn.) - Black Poplar  
*Populus simoni* (Carr.) - Simon Poplar  
*Populus tremuloides* (Michx.) - Quaking Aspen  
*Prunus avium* (Linn.) - Sweet Cherry  
*Prunus cerasifera* (Ehrh.) - Cherry Plum  
*Prunus cerasus* (Linn.) - Dwarf or Pie Cherry  
*Prunus padus* (Linn.) - Bird Cherry  
*Prunus pennsylvanica* (Linn.) - Pin Cherry, Bird Cherry  
*Prunus persica* (Sieb. & Zucc.) - Peach  
*Prunus serotina* (Ehrh.) - Wild Black Cherry  
*Prunus subhirtella* (Miq.) - Rosebud or Japanese Cherry  
*Prunus virginiana* (Linn.) - Choke Cherry

*Pyrus communis* (Linn.) - Common Pear  
*Quercus alba* (Linn.) - White Oak  
*Quercus bicolor* (Willd.) - Swamp White Oak  
*Quercus coccinea* (Muench.) - Scarlet Oak  
*Quercus imbricaria* (Michx.) - Shingle Oak  
*Quercus macrocarpa* (Michx.) - Bur Oak, Mossy-cup Oak  
*Quercus Marilandica* (Muench.) - Black Jack or Jack Oak  
*Quercus palustris* (Linn.) - Pin Oak  
*Quercus phellos* (Linn.) - Willow Oak  
*Quercus prinus* (Linn.) - Basket Oak. syn *Quercus michauxi*  
*Quercus robur* (Linn.) - English Oak  
*Quercus rubra* (DuRoi.) - Red Oak. syn. *Quercus borealis maxima*  
*Quercus velutina* (Lam.) - Black Oak  
*Robinia pseudoacacia* (Linn.) - Black Locust  
*Salix alba* (Linn.) - White or Huntingdon Willow  
*Salix babylonica* (Linn.) - Weeping Willow, Napoleon Willow  
*Salix caprea* (Linn.) - Goat Willow  
*Salix vitellina* (Linn.) - Golden Willow. syn. *Salix alba vitellina*  
*Sassafras albidum* (Nutt.) - Sassafras. syn. *Sassafras variifolium*  
*Sassafras variifolium* (Kuntze.) - Sassafras. syn. *Sassafras albidum*  
*Sophora japonica* (Linn.) - Chinese Scholartree  
*Sorbus americana* (Marsh.) - Mountain Ash  
*Sorbus aucuparia* (Linn.) - European Mountain Ash, Roan tree  
*Syringa japonica* (Decne.) - Japanese Tree Lilac. syn. *Syringa amurensis* (Rupr.)  
*Tilia americana* (Linn.) - Basswood, Whitewood  
*Tilia cordata* (Mill.) - Littleleaf Linden  
*Tilia europaea* (Linn.) - Common Linden, Lime tree. syn. *Tilia vulgaris*  
*Tilia heterophylla* (Vent.) - Beetree Linden  
*Tilia petiolaris* (Hook. f. not D.C.) - Weeping White Linden  
*Tilia tomentosa* (Moench.) - Silver Linden  
*Tilia vulgaris* (Hayne.) - Common Linden, Lime tree. syn. *Tilia europaea*  
*Ulmus americana* (Linn.) - American or White Elm  
*Ulmus campestris* (Mill.) - English Elm. syn. *Ulmus procera*  
*Ulmus fulva* (Michx.) - Red or Slippery Elm  
*Ulmus glabra* (Huds.) - Scotch or Wych Elm  
*Ulmus procera* (Salisb.) - English Elm. syn. *Ulmus campestris*  
*Ulmus pumila* (Linn.) - Chinese or Siberian Elm  
*Ulmus thomasi* (Sarg.) - Rock Elm. syn. *Ulmus racemosa*  
*Ulmus racemosa* (Thomas, not Borkh.) - Rock Elm. syn. *Ulmus thomasi*  
*Zelkova serrata* (Mak.) - Sawleaf Zelkova

#### DECIDUOUS SHRUBS

*Acanthopanax pentaphyllum* (March.) - Five-fingered Aralia. syn. *A. sieboldiana*  
*Acanthopanax sieboldianus* (Mak.) - 5-fingered Aralia. syn. *A. pentaphyllum*  
*Acer ginnala* (Maxim.) - Amur Maple  
*Acer tataricum* (Linn.) - Tatarian Maple  
*Aesculus pavia* (Linn.) - Damask Horsechestnut  
*Aesculus parviflora* (Walt.) - Bottlebrush Buckeye  
*Alnus rugosa* (Spreng.) - Smooth Alder, Hazel Alder  
*Alnus viridis* (D.C.) - European Green Alder  
*Amelanchier alnifolia* (Nutt.) - Saskatoon. Syn. *Amelanchier canadensis* var.  
*Amelanchier ovalis* (Med.) - European Shadblow. syn. *Amelanchier rotundifolia*  
*Amelanchier rotundifolia* (Dum.-Cours.) - European Shadblow. syn. *A. ovalis*  
*Amorpha canescens* (Nutt.) - Lead Plant  
*Amorpha fruticosa* (Linn.) - False Indigo, Indigobush  
*Aralia spinosa* (Linn.) - Hercules Club, Angelica Tree  
*Aronia arbutifolia* (Spach.) - Red Chokeberry  
*Aronia melanocarpa* (Spach.) - Black Chokeberry  
*Azalea amoena* (Lindl.) - Amoena Azalea. syn. *Azalea obtusum*  
*Azalea arborescens* (Pursh.) - Sweet or Smooth Azalea. syn. *Rhododendron arborescens*  
*Azalea mollis* (molle) (Blume.) - Chinese Azalea  
*Azalea nudiflora* (nudiflorum) (Linn.) - Pinxterbloom  
*Azalea obtusum* (Lindl.) - Amoena Azalea. syn. *Azalea amoena*

*Azalea obtusum* (Lindl.) - Sweet or Smooth Azalea. syn. *Azalea amoena*  
*Azalea roseum* (Rehd.) - Downy Pinxterbloom  
*Azalea vaseyi* (Rehd.) - Pinkshell Azalea. syn. *Rhododendron vaseyi* (Gray)  
*Azalea viscosa* (viscosum) (Linn.) - Swamp Azalea or Swamp Honeysuckle  
*Baccharis halimifolia* (Linn.) - Groundsel Bush, Saltbush  
*Benzoin aestivale* (Nees.) - Spicebush, Spicewood. syn. *Lindera benzoin*  
*Berberis buxifolia* (Poir.) - Box Barberry  
*Berberis darwini* (Hook.) - Darwin Barberry  
*Berberis thunbergii* (D.C.) - Thunberg's or Japanese Barberry  
*Berberis wilsoni* (Hemsl.) - Wilson Barberry  
*Berberis vulgaris* (Linn.) - Common Barberry  
*Betula nana* (Linn.) - Dwarf Birch  
*Betula pumila* (Linn.) - Hairy Dwarf Birch  
*Buddleia davidi* (Franch.) - Butterfly Bush. syn. *Buddleia variabilis*  
*Buddleia variabilis* (Hemsl.) - Butterfly bush. syn. *Buddleia davidi*  
*Calycanthus floridus* (Linn.) - Carolina Allspice, Strawberry Bush  
*Caragana arborescens* (Lam.) Pea Shrub, Pea Tree  
*Castanea pumila* (Mill.) - Chinquapin  
*Catalpa bungei* (C.A.Mey.) - Manchurian Catalpa  
*Ceanothus americanus* (Linn.) - New Jersey Tea, Redroot  
*Cephalanthus occidentalis* (Linn.) - Buttonbush, Honeyballs  
*Chaenomeles lagenaria* (Loisel.) - Japanese Quince. syn. *Cydonia japonica*  
*Chionanthus virginica* (virginicus) (Linn.) - White Fringe, Fringe-tree  
*Clethra alnifolia* (Linn.) - Sweet Pepperbush, Summersweet  
*Colutea arborescens* (Linn.) - Bladder Senna  
*Comptonia asplenifolia* (Gaertn.) - Sweet Fern. syn. *Comptonia peregrina*  
*Comptonia peregrina* (Coult.) - Sweet Fern. syn. *Comptonia asplenifolia*, *Myrica*  
*Cornus alba* (Linn.) - Red or Tartarian Dogwood  
*Cornus amomum* (Mill.) - Silky Cornel, Kinnikinnick  
*Cornus baileyi* (Coult. & Evans) - Bailey Dogwood  
*Cornus paniculata* (L'Her) - Gray or Panicked Dogwood. syn. *Cornus racemosa*  
*Cornus racemosa* (Lam.) - Gray Dogwood. syn. *Cornus paniculata*  
*Cornus sanguinea* (Linn.) - Bloodtwig Dogwood  
*Cornus stolonifera* (Michx.) - Red-twigged Dogwood, Red-osier Dogwood  
*Corylus americana* (Walt.) - American Hazel-nut  
*Corylus avellana* (Linn.) - Filbert, European Hazel  
*Corylus cornuta* (March.) - Cuckold Hazel. syn. *Corylus rostrata*  
*Corylus rostrata* (Ait.) - Beaked Hazel. syn. *Corylus cornuta*  
*Cotinus coggyria* (Scop.) - Smoketree. syn. *Rhus cotinus*  
*Cotoneaster acutifolia* (Turcz.) - Peking Cotoneaster  
*Cotoneaster adpressa* (Bois.) - Creeping Cotoneaster  
*Cotoneaster divaricata* (Rehd. & Wilson) - Spreading Cotoneaster  
*Cotoneaster horizontalis* (Decne.) - Rock Cotoneaster, Quinceberry  
*Cotoneaster hupehensis* (Rehd. & Wilson) - Hupeh Cotoneaster  
*Cotoneaster racemiflora* (Koch.) - Coin-leaf Cotoneaster  
*Cydonia japonica* (Pers.) - Japanese Quince. syn. *Chaenomeles lagenaria*  
*Cytisus scoparius* (Link.) - Scotch Broom  
*Daphne mezereum* (Linn.) - Mezereon or Flowering Spurge  
*Deutzia gracilis* (Sieb. & Zucc.) Slender Deutzia  
*Deutzia lemoinei* (Hort.) Lemoine Deutzia  
*Deutzia scabra* (Thunb.) - Fuzzy Deutzia  
*Dirca palustris* (Linn.) - Leatherwood, Wicopy  
*Elaeagnus argentea* (Pursh.) - Silverberry, Wolf Willow. syn. *E. commutata*  
*Elaeagnus commutata* (Bernh.) - Silverberry. syn. *Elaeagnus argentea*  
*Elaeagnus longipes* (Gray) - Cherry Elaeagnus, Gumi. syn. *E. multiflora*  
*Elaeagnus multiflora* (Thunb.) - Cherry Elaeagnus. syn. *E. longipes*  
*Elaeagnus umbellata* (Thunb.) - Autumn Elaeagnus  
*Euonymus alata* (alatus) (maxim.) - Winged Burning Bush  
*Euonymus americanus* (Linn.) - Brook Euonymus  
*Euonymus atropurpureus* (Jacq.) - Wahoo, Skewerwood. syn. *E. atropurpurea* (Jacq.)  
*Euonymus europaeus* (Linn.) - Spindle Tree  
*Euonymus yedoensis* (Koehne.) - Yeddo Euonymus  
*Exochorda grandiflora* (Lindl.) - Pearlbush. syn. *Exochorda racemosa*  
*Exochorda racemosa* (Lindl.) - Pearlbush. syn. *Exochorda grandiflora*  
*Forsythia intermedia* (Zabel.) - Golden Bell  
*Forsythia suspensa* (Vahl.) - Golden Bell  
*Forsythia viridissima* (Lindl.) - Golden Bell





*Ribes alpinum* (Linn.) - Alpine or Mountain Currant  
*Ribes aureum* (Pursh.) - Golden Flowering Currant  
*Ribes odoratum* (Wendl.) - Missouri or Buffalo Currant  
*Ribes sanguineum* (Pursh.) - Red-flowered or Winter Currant  
*Robinia hispida* (Linn.) - Rose Acacia, Bristly Locust  
*Robinia viscosa* (Vent.) - Clammy Locust  
*Rosa carolina* (Linn.) - Pasture Rose. syn. *Rosa humilis*  
*Rosa eglanteria* (Linn.) - Sweet Briar, Eglantine. syn. *Rosa rubiginosa*  
*Rosa hugonis* (Hemsl.) - Father Hugo's Rose  
*Rosa humilis* (Marsh.) - Pasture Rose. syn. *Rosa carolina*  
*Rosa multiflora* (Thunb.) - Japanese or Many-flowered Rose  
*Rosa nitida* (Willd.) - Bristly or Glossy-leaved Rose  
*Rosa rubiginosa* (Linn.) - Sweet Briar or Eglantine. syn. *Rosa eglanteria*  
*Rosa rugosa* (Thunb.) - Rugose Rose  
*Rosa setigera* (Michx.) - Prairie Rose  
*Rosa wichuraiana* (Crep.) - Memorial Rose  
*Rosa zanthina* (Lindl.) - Korean Rose or Double Hugonis  
*Rubus allegheniensis* (Porter.) - American Blackberry  
*Rubus flagellaris* (Willd.) - Dewberry. syn. *Rubus procumbens*  
*Rubus idaeus* (Linn.) - European or Common Raspberry  
*Rubus occidentalis* (Linn.) - Black Raspberry or Blackcap  
*Rubus odoratus* (Linn.) - Flowering Raspberry  
*Rubus procumbens* (Muhl.) - Cultivated American Dewberry. syn. *Rubus flagellaris*  
*Rubus strigosus* (Michx.) - Common Red Raspberry. syn. *Rubus idaeus strigosus*  
*Salix candida* (Flugge.) - Rosemary Willow. syn. *Salix incana*  
*Salix discolor* (Muhl.) - Pussy Willow  
*Salix humilis* (Marsh.) - Prairie Willow  
*Salix incana* (Schränk.) - Rosemary Willow. syn. *Salix candida*  
*Salix irrorata* (Anders.) - Colorado Willow  
*Salix lucida* (Muhl.) - Shining Willow  
*Salix pentandra* (Linn.) - Laurel or Bayleaf Willow  
*Salix tristis* (Ait.) - Dwarf or Sage Willow  
*Sambucus canadensis* (Linn.) - Sweet Elder  
*Sambucus nigra* (Linn.) - European Elder  
*Sambucus racemosa* (Linn.) - Red-berried Elder  
*Shepherdia canadensis* (Nutt.) - Buffaloberry  
*Sorbaria sorbifolia* (A. Braun.) - Ash-leaved Spirea  
*Spirea arguta* (Zabel.) - Garland Spirea  
*Spirea bumalda* (Burvenich.) - Bumalda Spirea  
*Spirea prunifolia* (Sieb. & Zucc.) - Bridal Wreath, Plumleaf Spirea  
*Spirea thunbergi* (Sieb.) - Thunberg's Spirea  
*Spirea tomentosa* (Linn.) - Hardhack or Steeplebush  
*Spirea vanhouttei* (Zab.) - VanHoutte Spirea  
*Staphylea trifolia* (Linn.) - American Bladdernut  
*Stephenandra flexuosa* (Sieb. & Zucc.) - Cut-leaf Stephenandra. syn. *S. incisa*  
*Stephenandra incisa* (Thunb.) - Cut-leaf Stephenandra. syn. *S. flexuosa*  
*Symphoricarpus albus* (Blake.) - Snowberry. syn. *Symphoricarpus racemosus*  
*Symphoricarpus orbiculatus* (Moench.) - Indian Currant. syn. *S. vulgaris*  
*Symphoricarpus racemosus* (Michx.) - Snowberry. syn. *Symphoricarpus albus*  
*Symphoricarpus vulgaris* (Michx.) - Buckbrush. syn. *Symphoricarpus orbiculatus*  
  
*Syringa amurensis* (Rupr.) - Amur or Manchurian Lilac  
*Syringa chinensis* (Willd.) - Rouen Lilac  
*Syringa josikaea* (Jacq.) - Hungarian Lilac  
*Syringa pekinensis* (Rupr.) - Peking Lilac  
*Syringa persica* (Linn.) - Persian Lilac  
*Syringa sweginzowi* (Koeh. & Lingelsh.) - Chengtu Lilac  
*Syringa villosa* (Vahl.) - Himalayan Lilac  
*Syringa vulgaris* (Linn.) - Common Lilac  
*Tamarix gallica* (Linn.) - French Tamarisk  
*Tamarix parviflora* (DC.) - Tamarisk  
*Tamarix pentandra* (Pall.) - Five-stamen Tamarisk  
*Vaccinium angustifolium* (Ait.) - Lowbush Blueberry. syn. *Vaccinium pennsylvanicum*  
*Vaccinium corymbosum* (Linn.) - Highbush Huckleberry, Tall Blueberry  
*Vaccinium pennsylvanicum* (Lam.) - Lowbush Blueberry. syn. *V. angustifolium*  
*Viburnum acerifolium* (Linn.) - Dockmackie or Maple-leaved Viburnum  
*Viburnum americanum* (Mill.) - Crampbark or American Highbush Cranberry



*Viburnum burkwoodi* (Burkwood) - Gardenia-scented Snowball  
*Viburnum carlesii* (Hemsl.) - Fragrant Viburnum  
*Viburnum cassinoides* (Linn.) - Withe-rod  
*Viburnum dentatum* (Linn.) - Arrow-wood  
*Viburnum lantana* (Linn.) - Wayfaring Tree  
*Viburnum lentago* (Linn.) - Nannyberry, Sheepberry  
*Viburnum nudum* (Linn.) - Possumhaw or Smooth Withe-rod  
*Viburnum opulus* (Linn.) - European Highbush Cranberry  
*Viburnum prunifolium* (Linn.) - Blackhaw or Stagbush  
*Viburnum sieboldi* (Miq.) - Siebold Viburnum  
*Viburnum tomentosum* (Thunb.) - Doublefile Viburnum  
*Weigela amabilis* (Hort.) - Rose Weigela. syn. *Weigela florida*, *Diervilla florida*  
*Weigela floribunda* (Sieb. & Zucc.) - Crimson Weigela  
*Weigela florida* (Sieb. & Zucc.) - Rose Weigela. syn. *Weigela amabilis*  
*Xanthoceras sorbifolia* (sorbifolium) (Bunge) - Chinese Buckeye or Flowering Chestnut. syn. *Xanthoceras simplicissima* (Marsh.)  
*Xanthorrhiza apiifolia* (L'Her.) Yellowroot  
*Zanthoxylum americanum* (Mill.) - Prickly Ash

## VINES

*Actinidia arguta* (Miq.) - Silver Vine  
*Akebia quinata* (Decne.) - Five-fingered Akebia  
*Ampelopsis aconitifolia* (Bunge) Monkshood Vine  
*Ampelopsis brevipedunculata* (Maxim.) - Porcelain Berry. syn. *A. heterophylla*  
*Ampelopsis heterophylla* (Sieb. & Zucc.) - Turquoise Berry. syn. *A. brevipedunculata*  
*Ampelopsis quinquefolia* (Michx.) - Woodbine, Virginia Creeper  
 syn. *Parthenocissus quinquefolia*  
*Ampelopsis tricuspidata* (Sieb. & Zucc.) - Boston Ivy. syn. *Parthenocissus tricuspidata*  
*Aristolochia durior* (Hill) - Dutchman's Pipe. syn. *Aristolochia siphon*  
*Aristolochia siphon* (L'Her.) - Dutchman's Pipe. syn. *Aristolochia durior*  
*Bignonia grandiflora* (Linn.) - Chinese Trumpet Creeper. syn. *Campsis grandiflora*  
*Bignonia radicans* (Seem.) - Trumpet Vine. syn. *Campsis radicans*  
*Campsis grandiflora* (Thunb.) - Chinese Trumpet Creeper. syn. *Bignonia grandiflora*  
*Campsis radicans* (Linn.) - Trumpet Vine. syn. *Bignonia radicans*  
*Celastrus orbiculatus* (orbiculata) (Thunb.) - Oriental Bittersweet  
*Celastrus scandens* (Linn.) - Bittersweet  
*Clematis henryi* (Anderson-Henry) - Henry Clematis  
*Clematis jackmani* (Th. More) - Jackman Clematis  
*Clematis paniculata* (Thunb.) - Japanese Clematis  
*Clematis virginiana* (Linn.) - Virgin's Bower  
*Cocculus carolinus* (DC.) - Carolina Moonseed  
*Decumaria barbara* (Linn.) - Decumaria  
*Hydrangea petiolaris* (Sieb. & Zucc.) - Climbing Hydrangea  
*Lonicera japonica* (Thunb.) - Japanese Honeysuckle  
*Lonicera sempervirens* (Linn.) - Trumpet Honeysuckle  
*Menispermum canadense* (Linn.) - Moonseed  
*Parthenocissus quinquefolia* (L.) Planch. - Woodbine. syn. *Ampelopsis quinquefolia*  
*Parthenocissus tricuspidata* (Sieb. & Zucc.) - Boston Ivy. syn. *Ampelopsis tricuspidata*  
*Periploca graeca* (Linn.) - Silk Vine  
*Polygonum auberti* (Henry) - Silver-lace Vine  
*Polygonum baldschuanicum* (Regel.) - Silver Lace Vine  
*Pueraria thunbergiana* (Benth.) - Kudzu Bean  
*Schizophragma hydrangeoides* (Sieb. & Zucc.) - Japanese Hydrangea Vine  
*Smilax glauca* (Walter) - Cat-briar or Saw-briar  
*Smilax hispida* (Muhl.) - Green Briar  
*Smilax rotundifolia* (Linn.) - Horse Briar  
*Solanum dulcamara* (Linn.) - Deadly Nightshade  
*Vitis aestivalis* (Michx.) - Summer Grape  
*Vitis coignetiae* (Pulliat.) - Gloryvine  
*Vitis labrusca* (Linn.) - Fox Grape  
*Vitis vulpina* (Linn.) - Riverbank or Frost Grape  
*Wisteria floribunda* (DC.) - Japanese Wisteria  
*Wisteria sinensis* (Sweet) - Chinese Wisteria

## BROAD-LEAVED EVERGREENS

*Andromeda polifolia* (Linn.) - Wild or Bog Rosemary  
*Arctostaphylos uva-ursi* (Spreng.) - Bearberry, Kinnikinnick  
*Berberis neuberti* (Lem.) - Neubert Barberry. syn. *Mahoberberis neuberti*  
*Berberis mentorensis* (Wayside) - Mentor Barberry  
*Buxus sempervirens* (Linn.) - Boxwood  
*Calluna vulgaris* (Hull) - Heather, Ling  
*Chamaedaphne calyculata* (Moench.) - Leatherleaf, Cassandra  
*Chimaphila umbellata* (Nutt.) - Pipsissewa, Prince's Pine  
*Daphne cneorum* (Linn.) - Garland Flower  
*Epigaea repens* (Linn.) - Trailing Arbutus, Mayflower  
*Erica carnea* (Linn.) - Moor Heath  
*Erica cinerea* (Linn.) - Scotch Heath  
*Erica tetralix* (Linn.) - Cross-leaved Heath  
*Erica vagans* (Linn.) - Cornish Heath  
*Euonymus fortunei* (Turcz.) - Wintercreeper. syn. *Euonymus radicans*  
*Euonymus japonica* (Linn.) - Evergreen Burning Bush  
*Euonymus radicans* (Sieb.) - Wintercreeper. syn. *E. fortunei*  
*Gaultheria procumbens* (Linn.) - Checkerberry, Wintergreen  
*Hedera helix* (Linn.) - English Ivy  
*Ilex aquifolium* (Linn.) - European or English Holly  
*Ilex crenata* (Thunb.) - Japanese Holly  
*Ilex glabra* (Gray) - Inkberry  
*Ilex opaca* (Ait.) - American or Christmas Holly  
*Kalmia angustifolia* (Linn.) - Sheep-Laurel, Lambkill  
*Kalmia latifolia* (Linn.) - Mt. Laurel, Calico Bush  
*Kalmia polifolia* (Wangh.) - Pale Laurel  
*Ledum groenlandicum* (Oed.) - Labrador Tea  
*Leucothoe catesbaei* (Gray) - Drooping Leucothoe  
*Lyonia mariana* (Linn.) - Staggerbush. syn. *Pieris mariana*  
*Mahoberberis neuberti* (Baumann) - Neubert Barberry. syn. *Berberis neuberti*  
*Mahonia aquifolium* (Nutt.) - Oregon Grape  
*Pachistima canbyi* (Gray) - Ratstripper  
*Pachysandra terminalis* (Sieb. & Zucc.) - Mt. Spurge  
*Pieris floribunda* (Benth. & Hook) - Fetterbush  
*Pieris japonica* (D. Don) - Japanese Andromeda  
*Pieris mariana* (Benth. & Hook.) - Staggerbush. syn. *Lyonia mariana*  
*Pyracantha coccinea* (Roem.) - Scarlet Firethorn  
*Rhododendron catawbiense* (Michx.) - Rose Bay, Catawba Rhododendron  
*Rhododendron maximum* (Linn.) - Great Laurel, American Rose Bay  
*Viburnum rhytidophyllum* (Hemsl.) - Leatherleaf Viburnum  
*Vinca minor* (Linn.) - Myrtle, Lesser Periwinkle

## CONIFERS

*Abies balsamea* (Mill.) - Balsam Fir, Balm of Gilead  
*Abies cilicica* (Carr.) - Cilician Fir  
*Abies concolor* (Lindl. & Gord.) - White or Silver Fir  
*Abies Fraseri* (Poir.) - Fraser Fir or She Balsam  
*Abies homolepis* (Sieb. & Zucc.) - Nikko Fir. syn. *Abies brachyphylla*  
*Abies nordmanniana* (Spach.) - Nordman or Caucasian Fir  
*Abies veitchi* (Lindl.) - Veitch Fir  
*Cedrus atlantica* (Manetti) - Atlas or Algerian Cedar  
*Cedrus deodara* (Laws.) - Deodar Cedar  
*Cedrus libani* (Laws.) - Cedar of Lebanon  
*Chamaecyparis lawsoniana* (Parl.) - Lawson's Cypress. syn. *Cupressus lawsoniana*  
*Chamaecyparis nootkatensis* (Sudw.) - Nootka Cypress  
*Chamaecyparis obtusa* (Endl.) - Hinoki Cypress  
*Chamaecyparis pisifera* (Endl.) - Sawara Cypress, Retinospora  
*Chamaecyparis thyoides* (Brit.) - White Cedar  
*Cryptomeria japonica* (D. Don.) - Cryptomeria  
*Cupressus lawsoniana* (A. Murr.) - Lawson Cypress. syn. *Chamaecyparis lawsoniana*  
*Cupressus macrocarpa* (Hartw.) - Monterey Cypress

*Cupressus sempervirens* (Linn.) - Italian Cypress  
*Juniperus chinensis* (Linn.) - Chinese Juniper  
*Juniperus communis* (Linn.) - Common Juniper  
*Juniperus excelsa* (Bieb.) - Greek Juniper  
*Juniperus horizontalis* (Moench.) - Creeping Juniper  
*Juniperus japonica* (Hort.) - Prostrate Juniper. syn. *J. chinensis japonica* (Carr.)  
*Juniperus sabina* (Linn.) - Savin Juniper  
*Juniperus squamata* (Buch.-Ham.) - Creeping Cedar  
*Juniperus virginiana* (Linn.) - Red Cedar  
*Larix europaea* (DC.) - Larch. syn. *Larix decidua* (Mill.)  
*Larix laricina* (K. Koch) - Tamarack, Hackmatack  
*Picea canadensis* (BSP.) - White or Canadian Spruce. syn. *P. glauca* (Moench.)  
*Picea engelmanni* (Engelm.) - Engelman Spruce  
*Picea excelsa* (Link.) - Norway Spruce. syn. *Picea abies* (L.)  
*Picea mariana* (BSP.) - Black Spruce  
*Picea omorika* (Bolle) - Serbian Spruce  
*Picea orientalis* (Carr.) - Oriental Spruce  
*Picea polita* (Carr.) - Tigertail Spruce  
*Picea pungens* (Engelm.) - Colorado Spruce  
*Pinus banksiana* (Lamb.) - Jack Pine or Scrub Pine  
*Pinus bungeana* (Zucc.) - Lace-bark Pine  
*Pinus cembra* (Linn.) - Swiss Stone Pine  
*Pinus flexilis* (James) - Limber Pine  
*Pinus montana* (Mill.) - Swiss Mountain Pine  
*Pinus mugo* (Turra.) - Mugho Pine. syn. *Pinus montana mugo*  
*Pinus nigra* (Arnold) - Austrian Pine  
*Pinus ponderosa* (Dougl.) - Western Yellow Pine, Bull Pine  
*Pinus resinosa* (Ait.) - Red Pine, Norway Pine  
*Pinus rigida* (Mill.) - Pitch Pine  
*Pinus strobus* (Linn.) - White or Weymouth Pine  
*Pinus sylvestris* (Linn.) - Scotch Pine  
*Pinus virginiana* (Mill.) - Scrub or Jersey Pine  
*Pseudotsuga douglasii* (Carr.) - Douglas Fir. syn. *P. taxifolia*  
*Pseudotsuga taxifolia* (Poir.) - Douglas Fir. syn. *Pseudotsuga douglasii*  
*Sciadopitys verticillata* (Sieb. & Zucc.) - Umbrella Pine  
*Taxodium distichum* (Rich.) - Bald Cypress  
*Taxus baccata* (Linn.) - English Yew  
*Taxus canadensis* (Marsh.) - American Yew  
*Taxus cuspidata* (Sieb. & Zucc.) - Japanese Yew  
*Thuja koraiensis* (Nakai) Korean Arborvitae  
*Thuja occidentalis* (Linn.) - Arborvitae or White Cedar  
*Thuja orientalis* (Linn.) - Oriental Arborvitae. syn. *Biota*  
*Thuja plicata* (Don.) - Giant Arborvitae  
*Tsuga canadensis* (Carr.) - Hemlock  
*Tsuga caroliniana* (Engelm.) - Carolina Hemlock

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